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THE

AMERICAN NATURALIST,

A

POPULAR ILLUSTRATED MAGAZINE

OF

NATURAL HISTORY.

EDITED BY
A. S. PACKARD, JR., E. S. MORSE, A. HYATT AND F. W. PUTNAM.

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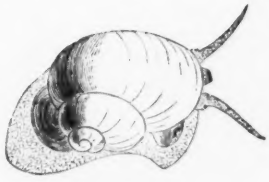

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ERRATA TO VOL. III. — Page 3, line 19, for "was" *read* "were." Line 26, for "between" *read* "among." Page 32, line 4, from bottom, mark out the "?" after *Seiurus Novæboracensis*. Page 34, line 14, for "N. W." *read* "Arizona." Page 34, mark out lines 28, and 29 after the word "*Oscines*," and substitute the following: — "yet this bird is a magnificent singer in spring." Page 35, line 10, after "*Vireo olivaceus*," mark out the "? and *V. Bartramii* Swainson." Page 35, line 17, for "*V. gilvus*," read "*V. Swainsonii* Baird." Page 105, line 2, from bottom, for "RAYMOND" *read* "HAYMOND." Page 222, line 29, for "Sixteen species of ducks," *read* "six species, etc." Page 285, line 11, from bottom, for "appear in" *read* "upon." Page 455, "*Alcyonella stagnorum*," is a Fresh-water Polyzoan and not a sponge as stated. Page 531, line 7 from bottom, for "tiny" *read* "limy." Plate 10 is marked Plate 9 by mistake.

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SHELL-MONEY.

BY R. E. C. STEARNS.

To THE numismatist the love of money is not fraught with evil; his love is not the worship of Mammon or the miser's greed, but rather the ardor of the philosopher or the enthusiasm of the naturalist; he glorifies his coins, not for their commercial value, but for their antiquity or historical associations. As he ponders over his collection, a panorama of past centuries unrolls before him; he sees a long procession of great events, the rise and fall of nations and of men whose emblems and effigies, embossed upon their money, have outlived the national life. More eloquent than written history are these speechless coins. Though silent, they tell of epochs in the lives of the nations they represent, and of eras in the history of the human race.

Notwithstanding the importance of money from an historical point of view, it is not probable that its invention was due to any other cause than commercial necessity; although coins for money are the offspring of civilization, yet the convenience of some medium, less bulky and more durable than ordinary merchandise, by which the differences occurring in transactions of trade or barter may be adjusted, has been recognized by barbarous tribes as well as by civilized people.

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The knowledge and use of peculiar narcotics and alcoholic beverages by portions of the human race, both civilized and barbarous, unacquainted with and widely separated from each other is a well-known fact. Analogous to this is the use of some form of money or a medium in trade by isolated and remote tribes.

The earlier coins of ancient Rome appear rude and grotesque when placed side by side with the exquisitely wrought coins and medals of Napoleon the First. But what a degree of civilization and knowledge of the arts do they proclaim when compared with the barbarism of those wild tribes of Africa and America, whose utter ignorance of the arts has led them to use as a substitute for metallic money, the shells of the ocean!

Mr. J. K. Lord, naturalist to the British North American Boundary Commission, during the years 1858–62, mentions the use of shells as money by the natives of the North-west coast of America, as follows:

"It is somewhat curious that these shells (Dentalia) should have been employed as money by the Indians of North-western America; that is, by the native tribes inhabiting Vancouver's Island, Queen Charlotte's Island and the main-land coast from the Straits of Fuca to Sitka. Since the introduction of blankets by the Hudson Bay Company the use of these shells, as a medium of purchase, has to a great extent died out, the blankets having become the money, as it were, or the means by which everything is now reckoned and paid for by the savage. A slave, a canoe or a squaw, is worth in these days so many blankets; but it used to be so many strings of Dentalia."

Mr. W. H. Dall, who has recently returned from Alaska, and whose opportunities for observation have been ample, informs me that the Dentalia are used by the native Alaskans, and that the furs purchased of the Indians by the fur companies, or their agents and traders, are still, at least in part paid for with these shells. This is still farther confirmed by

the facts that the larger European species of Dentalia are imported especially for this trade, and I have myself seen in the fancy goods stores in San Francisco, strings of these shells displayed for sale with beads and other Indian goods.

It is undoubtedly true, as stated by Mr. Lord, that the use of shell-money has, in a great measure, ceased at the points he mentions, as the increased number of white traders and visitors at the principal towns on the coast, as far north as Sitka, has somewhat familiarized the natives with the manners and customs of civilized people, which their natural shrewdness would lead them to adopt so far as it might be to their advantage.

As proof of the "cuteness" of the "untutored savage" in this latter respect, it may be interesting to state that at or about the time of the purchase by and transfer to the United States of the territory of Russian America, attended as it was by the visit of a considerable number of adventurers and others at Sitka, the prices of venison and other game, was, in the language of traffic, so far "marked up" that gold or its equivalent, to the amount of one dollar a piece was charged for salmon, a most exorbitant price, not justified by any greatly increased demand, or by any unusual scarcity of this wonderfully abundant fish in that country.

In the year 1861, during a visit of a month's duration upon the coast of California, at Crescent City, in Del Norte County, I found that in barter between themselves, the Indians used for money the shells of *Dentalium pretiosum* Sowerby, a species that is found all along the North-west coast of America and which, either the shells or the shell-money, is called by the Indians, if I remember correctly, *Alli-ko-cheek* (orthography not warranted correct), and the longer the shells the greater the value, which was reckoned by measuring the shells by the finger joints. I am quite sure that the same species were used by the Indians who live in the Klamath River country, in the next county to the south, and who get their name from the river, being known as the Klamath Indians.

Aside from the use of *Dentalium pretiosum* as money, I saw at Crescent City a medicine man belonging to some of the tribes of the neighborhood, who had perforated the grizzly partition which separates the nostrils, and having thrust into the hole thus made two of these shells, point to point, one from each side, for half the length of the shells, perfected this nasal ornamentation by thrusting the feathers of some wild fowl into each of the hollow shells, producing an effect somewhat resembling a mustache.

At Bodiga, much farther to the south on the coast of California, and near the old Russian settlement in Sonoma County, a place visited by me in the month of June, 1867, I was informed by some of the residents that the Indians of that neighborhood, living, however, somewhat back from the coast, used pieces of the bivalve shell known as *Saxidomus gracilis** for money, but why they should use this shell instead of the lustrous and pearly *Haliotis rufescens*, which is fully as abundant, it is impossible to discover.

The use of shells or pieces of shell by the aborigines of North America, was well known and recorded years ago. By reference to the Massachusetts Historical Collections, it will be seen that the early settlers of New England found that shells, or strings of shells, were used by the Indians, both for money and ornament, and were called by them *Wompompeage* or *Wampum*.

The natives of some of the islands of the Indo-Pacific region use the shells of *Litorina obesa*, and they also make very pretty work by evenly fastening these shells to pieces of bark, which, when made, they use for personal ornament. In other of the islands, I have been informed that the banded variety of *Nerita polita* is used for the same purposes.

Cypræa annulus is used by the Asiatic islanders to adorn their dress, to weight their fishing nets, and for barter. Specimens of it were found by Dr. Layard in the ruins of Nimroud.†

* *Tapes gracilis* Gould. † Woodward's Manual, second edition, p. 233.

The money cowry, *Cypræa moneta*, a native of the Pacific and Eastern seas, is used as money in Hindostan and many parts of Africa. They are chiefly brought from the Maldives, and are an article of trade at Bombay. Many tons weight are annually imported to this country (Great Britain), and again exported for barter with the native tribes of Western Africa. In the year 1848 sixty tons were imported into Liverpool, and in 1849 nearly three hundred tons were brought to the same port.*

Reeve mentions in the second volume of the "Conchologia Systematica," that "a gentleman residing some time since at Cuttack, is said to have paid for the erection of his bungalow entirely in these cowries (*C. moneto*). The building cost him about 4000 *rupees sicca* (£400 sterling), and as sixty-four of these shells are equivalent in value to one 'pice,' and sixty-four 'pice' to a *rupee sicca*, he paid for it with above sixteen millions of these shells."

It will be seen, therefore, that shells have been and are still used as money by a considerable portion of the human race, and it would be quite difficult to point out any other natural production that would be more appropriate or convenient, when size, shape and substance, are considered.

The money of the wild tribes of America, Africa and Asia, one may look for in vain in the drawers of the coin collector. It must be sought for in the museums of natural history, or the cabinets of the conchologist.

THE BOTANY OF CENTRAL ILLINOIS.

BY E. L. GREENE.

In a region of extensive prairies, the monotonous uniformity of the landscape affords none of the conditions for a flora rich in species. Although the soil of these vast

*Baird's Dictionary of Natural History, p. 193.

natural meadows is of almost unparalleled fertility, and its vegetation is always abundant and of luxuriant growth, the number of species is small. While many of the natural families of plants are wholly wanting, and other large ones but feebly represented, two or three for the most part clothe the prairies. These are the Compositæ, the Cyperaceæ and the Gramineæ; or, to use plain English, the compound flowers, the sedges and the grasses.

Let us take a glance at our prairie herbal and notice some of the blanks. First, we find the whole order of the Ranunculaceæ represented only by *Anemone Pensylvanica* and *A. cylindrica*, if we except *Ranunculus Purshii*, an aquatic rarely found in ponds on low prairies. Of the pretty family of violets we find only *Viola cucullata*, and that only occasionally in the low moist places. Passing to the heath tribe (Ericaceæ), one of the most delightful natural orders in all our North American flora, we find not one growing on the prairies of Illinois. And even if we leave the prairie and search the woods and river bluffs ever so thoroughly we still find none.

The Indian Pipestem (*Monotropa uniflora*) will be found rarely in low woods, and is the only species of the order which the writer has observed during two years of botanical research in this section of the country.

There is another still more interesting family, the Orchids. Of these only three are found on the prairies, namely: the White-flowered Ladies' Slipper (*Cypripedium candidum*), a Spiranthes of doubtful species, and the so-called Prairie Orchis (*Platanthera leucophea*). Why the last mentioned plant has received the popular name of Prairie Orchis we cannot conjecture, for it looks, when growing on the prairie, like a half starved and homesick foreigner to one who has seen its luxuriant growth by hundreds in the tamarack marshes of Wisconsin.

"Well," says some New England friend, "your Illinois prairie must be a rather dry field for a botanist in May or

June. These families of plants which you have mentioned as nearly absent from *your* flora are the very ones which furnish *our* spring with all her glories." And we must admit that the loss from our vernal list of the Kalmias, Azaleas, and less gorgeous but more lovely members of the same family is almost an irreparable one; nevertheless if our botanical *confrére* of the East will favor us with a visit next spring we will gladly satisfy him that we are not without our share of vernal beauties. Although the composites are more especially the flowers of the prairie, and we are obliged to wait for the intense rays of the summer sun to call them forth, yet there are a few charming ones among them, the brilliant *Phlox maculata*, which is, as it deserves to be, a frequent tenant of the gardens at the East, also the pretty *Houstonia purpurea*, equally as long as its congener of the New England meadows, *H. cerulea*.

But we shall not take our guest to the prairie for our first excursion. We shall prefer a visit to yonder belt of timber, which we see a few miles in the distance. There we shall doubtless find a running stream with shady bank, and beyond a tract of what is called in western parlance "bottom land," which is simply an open plain, slightly elevated above the low banks of the stream, surrounded by and sometimes covered with timber, and which has a flora different from that of the prairie.

From the moment we enter the timber we find a profusion of flowers. Scattered over all the shaded slopes grows the graceful but odd looking *Dicentra cucullaria*. We say odd looking, because the shape of the flower is so remarkably similar to the outline of a common house fly. Nestling close beside some decaying log we may, perhaps, find *Dicentra Canadensis* with its pure white heart-shaped flowers, not less interesting than its more common sister species. Yonder we see an extensive patch of *Mertensia Virginica*, which with its nodding clusters of richest blue presents a picture of surpassing beauty.

Raising their heads above the foliage of that miniature grove of wild mandrakes are a few specimens of the Yellow Ladies' Slipper (*Cypripedium pubescens*), and below them in stature, but of superior beauty, we find the Showy Orchis (*Orchis spectabilis*). In the groves of the "river bottom" are to be found our New England violets and buttercups, and other species of the same genera which are peculiarly Western, and with them are Phloxes, Erythroniums and other plants equally worthy to be mentioned, but their names would occupy too much space. The elegant *Collinsia verna* must, however, not be omitted, nor the flaming Red-bud, which is now clothed only with its garlands of purple flowers, and rivals in its dazzling splendor some of our choicest exotics.

In August the prairies put on their gold and purple when the Rudbeckias, Helianthuses, Silphiums and other allied genera, appear in flower in about eighteen different species, all having purplish or purple disks and yellow rays. In contrast with these, the purple Cone-flower, Echinacea, displays its long drooping *purple* rays, and more showy than these are the long purple racemes of several species of Liatris. Succeeding these come the Asters and Eupatoriums of different hues, and the Solidagos or Golden-rods and kindred composites of about twenty-five species. Finally in November the Geradias and Gentians close the season of botanizing on the prairies of Illinois.

THE CHIMNEY SWALLOW.

BY AUGUSTUS FOWLER.

This bird arrives at the eastern part of Massachusetts usually between the twenty-fifth of May and the first of June, departing for the South in the latter part of August. Not arriving until the season has far advanced, it is, consequently, the last of the family of swallows to visit its breed-

ing place. After their arrival they visit some unoccupied chimney or hollow tree, which a great number use as a temporary residence during stormy weather, and to roost in. In this as it were aimless gathering-place, they do not long remain, but soon begin to select their companions, and at such times they may be seen high in the air, especially in the middle of an extremely warm day, chasing each other in circles upon extended wings, but without that quick vibrating motion they employ when in pursuit of their prey, uttering the while their peculiar notes; their choice of mates being made they commence building their nests. They are usually placed in a chimney, in which a number of pairs breed, for they colonize the same place to the number of three or four pairs, and sometimes to fifty pairs, more or less. The nest is constructed in a singular manner: it is made of small dry twigs, broken from some dead branch of a tree by the bird flying swiftly against it, and then carried to the spot and fastened to it with a strong viscid substance supplied by their large salivary glands. Each stick is laid near the other and some crosswise, and there glued by the bird until the nest is finished, which is done by spreading over the entire surface of it, as well as the sides of the wall to which it is attached, a coat of the same tenacious gum. It resembles a shelf, containing only a small cavity to receive the eggs, and lacks the soft lining that characterizes the nests of other species of swallows.

In the month of May (1868) a chimney was taken down in the village called Putnamville, in Danvers. It was a large chimney connected with a shoe factory, that had not been used for four or five years. During the time of its disuse a large colony of chimney swallows occupied it to breed in. I had a good opportunity to examine their nests, to take their dimensions, etc., and not one of the many which I saw (and the number of nests were upwards of two hundred) were "lined with a few feathers and straws."

Although their visit is short, they raise two broods in the

season. The first nest being built, the female lays usually four pure white eggs, which measure thirteen-sixteenths of an inch in length, by seven-sixteenths of an inch in breadth, and is assisted by the male in the process of incubation. A few days after the young appear, the male takes them in charge, while the female builds again, as she is seen in the last of June obtaining materials to build or to repair another nest, and thus we see young birds in the same chimney of a different size and age; it therefore requires all the energies of the parent birds to supply their offspring with a sufficiency of food, and claims their labor through the day and a greater part of the night. Some species of the family of finches conduct their family affairs in like manner.

Mr. Audubon, in speaking of the habits of the song-sparrow, remarks: "among the many wonders unveiled to us by the study of nature, there is one which long known to me, is not the less a marvel at the present moment. I have never been able to conceive why a bird which produces more than one brood in a season, should abandon its first nest to construct a new one, as is the case of the present species; while other birds, such as the osprey and various species of swallows, rear many broods in the first nest which they have made, which they return to after their long annual migrations, repair and render fit for the habitation of the young brood to be produced." "There is another fact which renders the question still more difficult to be solved. I have generally found the nests of these sparrows cleaner and more perfect after the brood raised in them have made their departure, than the nests of other species of birds, mentioned above, are on such occasions,—a circumstance which would render it unnecessary for the song-sparrow to repair its nest."

The first nest of the sparrow is occupied by the first brood, and are tended by the male, while the female sparrow has built a second nest and is setting, and by the time the first brood is cast off by him, to care for themselves, he finds

another brood ready for his care; thus all the season is occupied by them in building nests, in incubation, and in rearing their young, until the moulting season arrives, which is about the twenty-fifth of August. The pigeon family breed in a similar manner, except that the young are fed from the crop of the male, and it is truly a greater wonder in nature, that there should exist a sympathy between the male pigeon and his offspring, and that at their appearance his crop should undergo so great a change. The rapacious birds return annually to their old nests, and by repairing them, make them suitable receptacles for their eggs. There is an unfitness in the structure of birds of prey which makes it inconvenient for them to build a nest with the facility of some other families of birds. The white-headed eagle selects some dead branch of a tree, and by hooking her bill on it, with her weight breaks it off. In its descent, she swoops and grasping it with her claws carries it away to make her nest; she pounces upon bunches of hay, sods of earth or any heap of rubbish, and carries it to the already accumulated heap of such substances. There is no artistic skill displayed in its construction; the top of it is merely a horizontal plane, with a shallow cavity to receive her eggs. Some families in this order of birds build better nests, but they show the same unhandy and awkward way in doing it, and there are some species of other families in this order which build no nest.

There are other birds, also, such as the swallows, whose forms are ill-adapted for good nest builders; with small feet and short weak legs it is toilsome for them to gather material for a nest from off the ground. Now observe all those birds whose structure is similar to that of the swallow family. Not one species of the family Caprimulgidæ builds a nest. The whippoorwill lays her eggs on the ground in the woods: the night-hawk on the naked rock, or the bare ground in open pastures. Look at the belted kingfisher, whose form is similar to the above mentioned birds; how ill-adapted he is to gather materials from the ground to form a nest. Al-

though a bird of strong pinion, yet deprive him of the use of his wings, and place him on the land, and he is almost helpless.

In the different species of the Picidæ, or Woodpecker family, are as many instances that the structure of birds determine whether those of certain forms build a nest or not, and if they do, they return to it annually to render it fit for a home for themselves and family during the breeding season.

It is a tedious task for the chimney swallow to procure the material for its nest; it requires energy, skill and strength to perform the work. Flying with force, they grasp the point of the twig with their bill, and often try several times before they succeed in breaking it off. The female visits her former breeding place, and examines her nest; if it needs repairs, she adds more twigs and gum to it, and it is all right again. Thirty years ago this species of swallow was rarely found breeding in Essex County; now many pairs breed in almost every village where they find an unoccupied chimney.

The Chimney Swallow (*Cypselus pelasgius*) does not possess the easy and graceful motion when on the wing that is shown by the Barn Swallow (*Hirundo rustica*) in his flight, but moving more swiftly and vigorously, they must destroy an innumerable number of insects in a season. It not unfrequently happens that their nest is dislodged from its place, and falls in consequence of rain or damp weather. When such accidents happen, the whole brood is precipitated to the bottom of the chimney. If its members are of sufficient age and strength, they will climb up again and remain clinging to its sides, until fledged and able to care for themselves.

There are occurrences happening to them which are of greater moment. Sometimes having selected a flue in the chimney leading to the bedroom, and having there brought forth their numerous young, and their cares consequently increasing so as to require their labors in the night, the rushing whirring noise of their flight as they pass up and

down the flue may so disturb the nervous sleeper that he is determined to be rid of such an annoyance; he accordingly prepares in the habitation of these birds a fire of straw; the parents of the unfledged young flee in dismay, and rise above their smoking tenement and wheel about in terror, then dive down near its top as though they would rescue their suffocating brood from a death so awful. At last their courage gone they turn and soar away above the scene, while their young drop one by one in the fire below, and the parental feelings of the old birds induce them to linger about their desolate home for many days. To obviate this inhuman practice, a board placed on the top of the chimney before they commence breeding is all that is necessary.

THE STRUCTURE OF THE PITCHER PLANT.

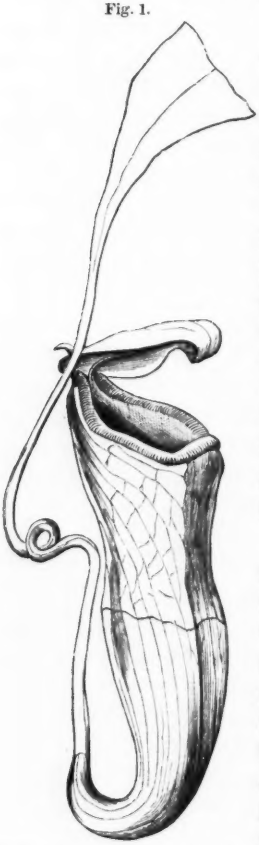
BY J. G. HUNT, M. D.

"High among the mountains,
Near the bubbling fountains,
Where the trees bend low,
Where the wild flowers grow,
'Mid the shadows deep"
Nepenthe's pitchers weep.

About twenty species of the genus Nepenthes are known to botanists, and while some are natives of swamps in Africa and China, most of the species are found on Mount Kinau Ballou, in the Island of Borneo, growing at an elevation of from three to eight thousand feet above the sea. The species whose minute anatomy we partially describe, is the *Nepenthes distillatoria*, found growing in China and at the Cape of Good Hope. This plant often attains the length of ten or twelve feet, generally lying prostrate, or partially supported by other plants. It bathes its roots in the hot swamps near the coast, but cannot lift its flowers very high in the sunshine, because its branching stem which bears many long and partly clasping leaves, and also its precious

burthen of watercups, is too feeble to support the weight. Seldom does the stem exceed two inches in diameter, being long and flexible like a rope.

Fig. 1.



Now, as all readers of the NATURALIST may not be botanists, we will state that the plants in question bear on the ends of their leaves peculiar appendages not unlike pitchers in form, and hence they are commonly known as pitcher-plants. Like the pitchers we use for domestic purposes, they are often colored with many gorgeous tints, and fashioned into graceful shapes, often with a capacity to hold more than a quart of liquid. As nature is seldom outdone by art, these forest cups have the ability to fill themselves, thus differing in an important respect from the pitchers we use.

For a long time it has been a question where this liquid came from, and our knowledge of the subject is still too limited to say from what part of the plant it is poured out, though *it is probable* special glands have been set apart to perform that function. To decide this question, certainly, would require close observation on the living pitchers, and that would be very difficult, because in their early stages of growth they are tightly closed by the curious lids at the top, and in the young state excretion is most rapid and copious.

Fig. 1 is an accurate drawing made (half size) from a pitcher that had been rendered transparent in order to show

its venation, and the position of both sets of glands. Minute dots, commencing at the bottom and extending to high-water mark,* represent the position and number of one series of glands, all on the inside of the pitcher. The under side of the lid also is covered with similar glands, having among them, however, numerous stomata.

Fig. 2.

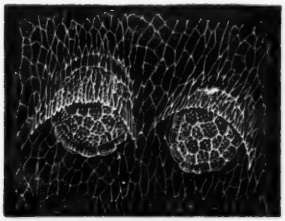
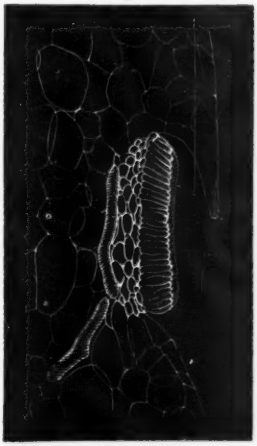


Fig. 2 shows a camera lucida drawing (magnified eighty diameters) of these glands, also rendered transparent, so that their anatomy may be seen at one view. They are depressed below the inner surface of the pitcher, and have, extending over nearly half the diameter of each, a projection of the epidermis like many little roofs, so that a stream of water poured in at the top would reach the bottom of the pitcher without touching a gland. The fine reticulation marking the surface of each, is caused by the ends of long columnar cells making up the gland structure, and these columnar cells rest on others of larger size, shown in the drawing. All the parts just described are best seen by a perpendicular section (Fig. 3, magnified one hundred and sixty diameters), and it may also be observed that each gland lies immediately over large isolated and *spiral* cells, which have no vascular connection with the ordinary spiral structure of the plant.

Fig. 3.



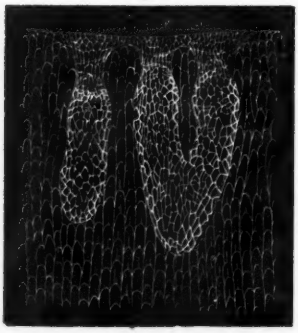
In a description, without illustrations, of this series of glands, published in the "Edinburgh New Philosophical

*Crossing the middle of the pitcher; the dots are omitted in the figure.

Journal" for 1832 and 1833, by Treviranus, he says the cuticle does not cover the glandular surface; it is, however, very easy to demonstrate that it is reflected down over each gland, and whatever liquid is excreted must filter through this cuticular covering before it falls into the pitcher.

By referring again to Fig. 1, it will be seen that a thickened margin or frill surrounds nearly the entire top of the pitcher. Now, embedded in this fleshy frill, lie many elongated, cylindrical glands, like guns on a fortification, all opening on its inner side by minute ducts which lead up to the glands. The size of these very peculiar organs varies, as shown in Fig. 4 (magnified eighty diameters), and sometimes they are united at the ends, though this can be regarded only as a curious malformation. The drawing shows the union of the ducts with each gland, and also their cellular structure, better than many words could describe it. In a side view of one of these glands, we see it is somewhat crescentic in shape; the orifice of the duct is apparent, and also the position of the gland with respect to the epidermis which covers the frill. This second series of organs lies embedded in a tissue, made up chiefly of large, isolated, spiral cells, developed to a degree not found probably in any other plant. Treviranus seems not to have been aware of these upper glands in Nepenthes, nor have we seen them noticed by any authority before.

Fig. 4.



In describing the structures alluded to in this paper, we have used the term gland for want of a better one, but we do not therefore assume any speciality of function. This is a point about which we are ignorant. The structure of an organ will not enable us to predict its function, though it

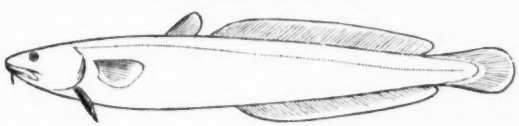
may afford rational ground for guess-work. Will not some one having the opportunity make observations on these singular organs in the living plant, in order to settle their function? We know not anywhere else in the vegetable kingdom organs more *apparently* set apart for a special purpose, and yet we are in doubt about their meaning.

Our native Sarracenia growing abundantly in swamps. with its cups, often the graves of drowned flies, is also called a pitcher plant, but differs widely in structure and habit from the Nepenthes. We allude to it now only to express our intention, if opportunity should offer, to illustrate its singular structure, as well as that of others of these remarkable plants, which nature *seems* to have appointed to set their traps among the swamps, but for what purpose, perhaps, we are not ready to explain.

We have been assisted in illustrating this paper by Miss Mary Peart and Miss Emma Walter, and the drawings were made from specimens in our possession.

THE COMPRESSED BURBOT OR EEL-POUT.*

BY WILLIAM WOOD, M. D.



Of the genus Lota, there are several species. The English Burbolt (Burbot), as described by Yarrell in his work on British fishes, and by Couch, belongs to this genus, yet probably is a different species from any in our lakes and rivers. Couch says, "the Burbolt (Burbot) is the only one of the extensive family of the codfishes which has its residence in fresh water, where it is distinguished by exhibiting some of

* *Lota compressa* Lesueur.

the manners of the eel, by which it has obtained the name of the eel-pout."

In this country, according to DeKay, we have three species: the Plain Burbot (*Lota inornata*) which is rare, the Spotted Burbot (*Lota maculosa*) which is abundant in our lakes, and the Compressed Burbot (*Lota compressa*) which is very rare.* DeKay, when he published the Fauna of New York, in the Natural History of that State, says, "the *only two specimens described* are from the Connecticut River and its tributaries. I know it only through the descriptions of Lesueur and Storer."

This species was first described by Lesueur from a specimen taken at Northampton, Mass. The second description was by Dr. D. Humphreys Storer, of Boston, from a specimen taken in the Ashuelot River. In his report on the Fishes of Massachusetts, page 134, published in 1839, he says, "the only specimen I have been able to see was sent me from Keene, N. H., taken in the Ashuelot River." In the Catalogue of the Fishes of Connecticut, by Rev. James H. Lindsley, in the American Journal of Science and Arts (Vol. 47, page 71) he says, "I obtained a fine specimen (*Lota compressa*), taken a few years since in New Canaan, Conn." In Dr. Storer's article on the fishes of Massachusetts, published in the Memoirs of the American Academy of Arts and Sciences (new series, Vol. 6, part second, page 360, published in 1858) he says, "the one from which this description was taken, was brought from the Connecticut River by Thomas M. Brewer, M. D., of Boston." If Dr. Storer refers to two specimens in his reports of 1839 and 1858, we have four specimens described; if to but one, *only three specimens have ever been described* so far as I can learn.

The specimen which I have before me was taken in Scantic

* All these species have been considered by Dr. Günther, in his Catalogue of Fishes in the British Museum, as one and the same species with the European Burbot. *Lota maculata* and *L. inornata* are undoubtedly synonyms, but until farther comparisons have been made we are inclined, with Dr. Wood, to leave *L. compressa* as a distinct species, and also to question the uniting of the European and American species.—EDITORS.

River, a tributary of the Connecticut, about four miles from East Windsor Hill, May 22, 1868, and was brought to me in a tub of water, which gave me a good opportunity to examine it in its natural state. There was one taken in the Farmington River, some six miles from this place, in an eel-pot a few years since, and was kept alive for several weeks.

The description given by Dr. Storer, in the two reports referred to, is so full that but little which is new can be added. The length of those described by Lesueur and Storer, were six and eight inches; by Lindsley, eleven and a quarter inches. The one before me is eleven inches long.

Color.—The back and sides are yellowish brown, with irregular patches of a darker color, marked somewhat like our pickerel, only a shade darker; the gill covers and snout are dark brown, the belly is of a light color in place of the yellowish on the sides; the first dorsal fin is lighter than the body; the second dorsal and caudal fins are dark at the base, yellowish in the middle, with the edge margined with black or dark brown; the anal fin is similarly marked, though a little lighter; the black margin is not as wide as on the dorsal.

Description.—The body is shaped very much like an eel, being cylindrical; the abdomen rather more prominent than in the eel. The head measures one and three-quarter inches in length and is compressed above. The sides begin to be compressed at the tip of the pectorals, and continue to be more so until it terminates in the caudal fin, which appears like a membranous continuation of the body; the tail fin is fan shaped, and measures one and a half inches in length at its longest point. The first dorsal is quite small, and is two inches from the head. The second dorsal is situated a quarter of an inch back of the first dorsal, and terminates at the base of the tail, and is rounded at its posterior extremity. The anal fin commences an eighth of an inch lower down than the dorsal, and terminates in the same manner. The ventral fins measure seven-eighths of an inch in length, and are composed of two free rays, one ray measuring five-

eighths, the other one-fourth of an inch. These free rays are used by the fish as feelers, in the same way as the barbel on the chin. The pectoral fins measure one and an eighth inches in length, and have one very minute free ray. On the chin is one barbel half an inch in length. The nostrils are double; from the back of the anterior nostril is a minute barbel. The eyes are circular, and three-quarters of an inch apart. Both upper and lower jaws are armed with minute teeth. The whole surface is covered with exceedingly small cup-shaped scales, which are not plainly visible except by the aid of a magnifying glass.

In the description given by Lesueur, Storer, Lindsley and DeKay, no mention is made of the free rays of the ventral fins. They are as distinct and noticeable as the barbel on the chin, and more so when swimming.

It is thought by some that *Lota compressa* and *Lota maculosa* are identical. I am not sufficiently versed in ichthyology to be a dictator or judge in the matter, yet the habits and dimensions of the two are so dissimilar as to lead me to suppose that they are two distinct species. The *Lota maculosa* is two feet in length at maturity. The largest *Lota compressa* ever known was the one described by Lindsley,—eleven and a quarter inches. The *Lota compressa* probably visits the salt water, as it is taken in ascending the Connecticut or its tributaries in the spring of the year, in company with fish from the salt water ascending to spawn. So few have been taken that it may not be wise to be positive in this assertion, yet I have no doubt, in my own mind, that it is a fact. Four have been taken to my knowledge within six miles of my office, within a few years, and all have been taken in the spring. Three of them were taken in company with the Lamprey eel (*Petromyzon Americanus*), in pots set for them, and the fourth (the one in my possession) was caught in a fine net with a promiscuous collection of fish.

The Spotted Burbot, on the contrary, lives exclusively in fresh water.

As I have called the attention of the fishermen in this vicinity to the rarity of this fish, I shall probably get specimens that would otherwise have been thrown away, and hope to gain farther information respecting this uncommon species.

SALT AND FRESH-WATER CLAMS.

BY EDWARD S. MORSE.

We choose these two animals for description since they are accessible to all. The inland student may rake from the pond or river the fresh-water clam, or mussel, in quantities, while the sea-side student has only to step into the market and order the salt-water clam by the bushel.

In presenting such descriptions for study, it is always best to cite as examples those forms which are most abundant, so that whatever statements are made can be quickly verified by an examination of the object described. A general knowledge once attained of the common animals, prepares one to enter farther into the study of zoölogy, and enables him, through the facts already garnered, to use his information in the prosecution of new investigations. We commence, then, with the description of an animal, about which little has been said except in books professedly scientific; an animal, however, long and well known from the cheap and excellent food it affords, and from its no less importance in providing bait for our fishing fleets.

That the daintiness of the clam for food was known to the aborigines of this country, is well attested by the huge piles of broken clam shells scattered along our eastern coast, and now buried beneath a foot or more of soil. Mingled with these piles the archæologist reaps a rich harvest of Indian relics, such as implements made of bone, fragments of pottery, etc.* These are the only evidences of by-gone

*In the NATURALIST, Vol. I, p. 561, Prof. J. Wyman describes the contents of some of these beds, with illustrations of the various relics.

tribes which have left their records in the remains of their feasts.

From an old book published in London in 1636, entitled "New England's Prospect," etc., it would appear that the squaw performed the hard work then, as now, and that, unimpeded with trailing skirt, she waded over the mud-flats in search of clams for her indolent master. From this book we make the following extract, more quaint than elegant, describing the "kinds of shell-fish."

> "The luscious lobster, with the crab-fish raw,
> The brinnish oyster, mussel, perriwigge,
> And tortoise sought by the Indian Squaw,
> Which to the flatts dance many a winter's jigge,
> To dive for cockles, and to dig for clams,
> Whereby her lazy husband's guts she cramms."

The shells also came in good use as table utensils, and from a work published about the year 1676, entitled "New England's Crisis," by Benjamin Thomson, the prologue commences thus:

> "The times wherein Old Pompion was a saint,
> When men fared hardly, yet without complaint,
> On vilest cates, the dainty Indian maize
> Was eat with clamp shells out of wooden trays."

Thus much for its historical interest; and now let us at once enter into an examination of the animal itself. A clam, as we find it in the market, does not certainly present a very inviting appearance. The two bluish white shells hold within an unintelligible yellowish mass, while projecting from one end is a wrinkled blackish lump, that upon being irritated withdraws within the shell, throwing out at the same time a stream of water, the shells meanwhile shutting together tightly. To appreciate the natural appearance of the animal, we must place it in its natural element—the sea-water. Be sure and get a dish long enough for its first stretch. A shallow pan twelve or fifteen inches in length will be sufficient. Having filled the pan with fresh sea-water and immersed our clam in it, we wait patiently, or leave it for a while, perhaps half a day; but finally the

blackened tube, improperly called the "head," gradually protrudes beyond the margins of the shell. Slowly extending, it attains the length of three or four inches, and now we notice that this organ has two openings at the end, beautifully fringed with appendages like little feelers, and mottled with the richest brown. And this tube, then, is really a double tube leading to the body of the clam. Notice carefully the opening and you will see a current of water pouring in at one of them, and as steadily flowing out of the other. These currents are produced by the tremulous motion of innumerable minute hairs, or cilia, which line the interior of the animal.

The clam has no power to seek its food, being confined to its burrow in the sand or mud. Its food consists of minute particles of organic matter floating in the water, and thus it is through the medium of the ingoing current of water, that nourishment is carried to it. While the water conveys food to the mouth, it is also charged with oxygen to revivify the blood; for the clam has blood, and a heart, and vessels to circulate it. What admirable uses do we see already in the so-called head of the clam. Lying buried as it is to a considerable depth in the mud, these tubes are thrust to the surface to conduct the pure water laden with nourishment for the stomach and gills. The water, as it passes out through the other tube, carries with it all excrementitious matter and other waste from the body.

In the "Annals and Magazine of Natural History," Messrs. Alder and Hancock describe the appearance of these currents. From their account we extract the following: "We lately have had an opportunity of observing *Mya arenaria* in its native haunts, and watched the play of its siphonal currents under very favorable circumstances. This species, at the mouth of the Tyne, buries itself to a depth of six or eight inches in a stiffish clay, mixed with shingle; and in shallow pools left by the tide the tubes may be seen just level with the surface of the muddy bottom in full action.

The mud lies closely packed against the walls of the tubes, so that nothing is seen but the expanded lips of the siphonal orifices fringed with numerous tentacles. When it happens that the surface of the water is only a little above these orifices, a strong current can be distinctly seen to boil up from the anal siphon, and another, with a constant steady flow, to set into the branchial one."

On plate 1, fig. 2, is represented a clam in its natural position in the mud, showing the extent to which the tubes, or siphons, can be extended; and in Fig. 1 a clam is represented with one of the shells—the left shell—removed. As we remove the shell, we are forced to separate two muscles which hold the shells, or valves, as they are called, together. The valves are forced apart by an elastic substance that occupies the little tongue-shaped tooth of the shell near the hinge, and in order to keep the valve together, the clam has to exert a constant force by contracting the muscles. The moment the muscles relax, the elastic substance forces the valves apart, acting as a piece of India-rubber would act if placed within the hinge of a door, and the door closed against it. Fig. 4, plate 1, represents a section of the valves of a clam, showing the elastic substance, L, and the transverse muscle, M.

Having opened the clam, we find lining the shells within a thin membrane called the mantle. Its border which follows the edges of the shell, is thickened and united, except a small slit through which the so-called foot projects. This organ has the power of excavating a hole in the mud. According to one writer, it assumes a variety of shapes while digging: "now a dibble or spade, a trepan or pointed graving tool, a hook, a sharp wedge."

The abdomen occupies the centre line of the body, and forms the principal edible portion of the clam. It contains the ovary and liver,—the liver being recognized by its dark color. (For the different parts see plate 1, and explanation of the plate.) The mouth of the clam is directly under the

forward transverse muscle. It will be seen by the position of the mouth, that the so-called head of the clam is not the head at all. One may call it the tail with more propriety, though it is simply two tubes united together, projecting from behind for the purposes before mentioned. On each side of the mouth are a pair of lappets or palpi; these probably assist in directing the minute currents of food into the mouth. The mouth opens almost directly into an irregularly shaped stomach. The intestine, after several turns in the abdomen, passes along the back, going directly through the heart, and terminates above the posterior muscle. Fig. 7, plate 1, represents the heart as seen from above. This consists of a ventricle (v) and two auricles (a), one on each side, which takes the blood from the gills. The gills are two in number, and hang from below the back, on each side of the abdomen. The thickened portion of the base of the tubes, commonly called the shoulder, are muscles to draw in the tubes. Space will not allow us to enter farther into the anatomy of the clam. We may add, however, that nearly all bivalves are organized in a similar way. We give a transverse section of a fresh-water mussel to show the various organs. (See the plate and explanation.)

The clam is used for food in Europe, Asia and America. Jeffrey says, "it forms one of the numerous articles of Chinese diet, being brought to market after having been boiled for a long time, and cooked with a seasoning of which onions are a base. The people call it Tsega." Fabricius states that in Greenland the clam is eaten by the walrus, Arctic fox, and birds.

In the fresh-water clam, instead of two long tubes covered by one sheath as in the sea-clam, we have two short tubes, one only being separate, the other merging into the mantle, which is open throughout; though by reference to the plate it will be seen that the tubes bear a general resemblance to those of the sea-clam. In the fresh-water clam the elastic substance opening the shells is outside, and pulls them apart when the

muscles relax (Pl. 1, fig. 5). While the sea-clam lies buried in the mud, head downward, with but little power of locomotion, the fresh-water clam has the faculty of moving through the mud or sand in which it lies partially embedded. Fig. 6, plate 1, represents the natural attitude of the Unio, or fresh-water clam. It will be seen that the tubes are above the level of the sand. The foot is very large, and with it the Unio is enabled to move along slowly, the shell wedging its way through the sand, leaving a groove or furrow along the river bottom, and often the collector takes advantage of these tracks in finding them.

But little is known regarding the development of the sea-clam, or Mya, as it is technically termed, but it is similar to that of the Unio. In these the eggs issue from the ovaries, and find their way into the cavities of the outer gills. There they develop until they are furnished with a little triangular shell, large enough to be recognized by the unassisted eye. At this stage they are discharged by thousands into the water, and are left to take care of themselves. It has been ascertained that they attach themselves by a little thread to the river bottom, thus preventing them from being swept away, though it is probable that not one in a hundred ever reaches maturity, as fishes and other aquatic animals feed upon them. Fig. 8, plate 1, represents the shell of the young Unio.

Many of the common fresh-water clams produce pearls, though the black mussel, with a white pearly interior, oftentimes produces pearls of considerable clearness. These pearls are caused by particles of sand or other irritating substance getting in between the mantle and shell. This irritates the animal, and this irritation causes the animal to deposit upon the particle layer after layer of pearl. In China, the natives taking advantage of their knowledge of the way in which pearls are formed, have shown their ingenuity by making flat lead castings of their little idols. These they insert in a species of fresh-water clam, by first wedging the shells

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Fig. 1.

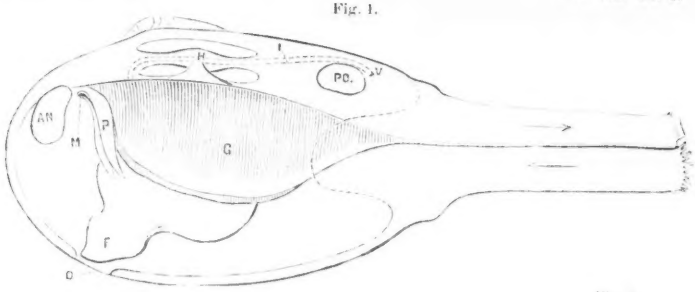


Fig. 2.

Fig. 3.

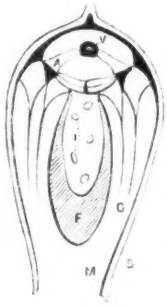


Fig. 4.

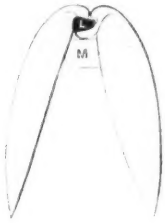
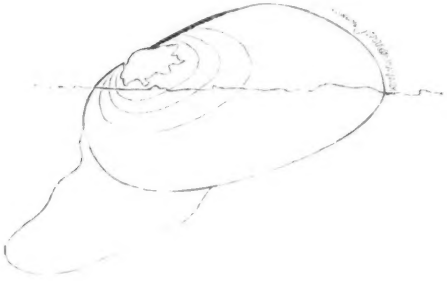


Fig. 5.

Fig. 7.

Fig. 8.

Fig. 6.



apart, and then slipping the idols in between the mantle and the shell. After a lapse of time they collect the shells and open them, and adhering to the interior of the shells they find the little lead images coated with a layer of pearl; these are neatly cut out from the shell, and are worn as charms.

It is a matter of wonder that some enterprising Yankee has not had recourse to this, as a novel mode in getting up shirt studs and sleeve buttons.

All these shells increase in size by depositing lime around the margin of the shells, and the concentric lines upon the outside of these shells indicate successive periods of growth and repose.

For additional information regarding another species of bivalve, the salt-water mussel, the reader is referred to Vol. II, p. 243, of this Magazine.

EXPLANATION OF PLATE I.

Fig. 1. Sea-clam, *Mya arenaria*, with the left valve removed. H, heart, I, intestine; G, gills; P, palpi; M, mouth; A N, anterior transverse muscle, technically anterior adductor. P O, posterior adductor; F, foot; O, opening in the mantle for foot; V, vent. This figure represents the clam with its back uppermost, and the anterior end turned to the left.

Fig. 2. Sea-clam in its natural position in the mud, head downward, showing the tubes extended to the surface of the mud.

Fig. 3. Ideal transverse section of fresh-water clam, *Unio*. I, intestine; F, foot; V, ventricle; A, auricle; G, gills; M, mantle; S, shell.

Fig. 4. Transverse section of *Mya*, showing the position of the spring to open the shell. M, muscle; L, ligament.

Fig. 5. Transverse section of *Unio*, showing the position of the spring to open the shell. M, muscle; L, ligament.

Fig. 6. Fresh-water clam, *Unio complanatus*, in its natural position, crawling. The anterior end is depressed, and the foot is seen thrust out ahead.

Fig. 7. Heart of clam seen from above. V, ventricle; A A, auricle; G G, line of gills.

Fig. 8. Young of *Unio*.

THE SENSES OF SIGHT AND SMELL OF THE WILD TURKEY AND THE COMMON DEER.

BY J. D. CATON.

It is claimed for the wild turkey that it has the quickest and most accurate sight of any known animal. It is a saying among old hunters that it can detect the human eye looking through a knot-hole from the inside of a hollow tree. I once observed an incident illustrative of its remarkable power of sight, and tending to show that its apprehension of scent is correspondingly dull.

In December, 1847, I was hunting deer on the Vermilion River, and had been following one from daylight till three o'clock in the afternoon, over the breaks and bluffs of the Vermilion River, through six inches of dry hard snow, almost as difficult to walk in as dry corn-meal. When near the foot of the bluff, not far below the mouth of Deer Park, some distance off, I saw a flock of wild turkeys crossing the river on the ice, and coming directly towards me. My ambition immediately fell from a deer to a turkey. I concealed myself in a very dense thicket of underbrush, and soon heard the turkeys approaching with that contented *quit, quit*, in which they frequently give expression to a happy sense of security. My pointer, which was as good at following a deer as a grouse, stood at my feet without moving a muscle, though his eyes shone like balls of fire when he scented the turkeys and heard them pass by. They passed, I should judge by the noise, not more than fifty or sixty feet from me, without taking the least alarm. About fifty yards distant there was a bare spot of considerable extent, near the brow of the bluff to which their course would evidently take them, where I promised myself a sure shot. I rested my gun against a small tree that I might make no perceptible motion before

firing. All but my head and arms was concealed by the bushes, even from the elevated position where I expected they would come in sight, and from an observation on a level with myself I was entirely concealed. I thus stood, anxiously listening to the birds, and so was enabled to notice their progress, and thus determine at what moment to expect their appearance in the open space. The first that appeared was the head and neck of the old cock that led the flock. It seemed as if he raised his head for the express purpose of looking at me, for the instant his head appeared he stared fixedly towards me, and gave the loud quick note of alarm. In a second or two he took wing, followed by the rest of the flock. I still think he was in a little doubt, else he would not have remained an instant after seeing me, and when he did fly, instead of going directly away, he passed near enough over me to satisfy his doubts.

The eyes of the turkey are so situated as to embrace within the range of vision a very large field. Here we see the sight was very quick if not absolutely certain. Although they had passed very near us, the sense of smell had given them no intimation of our presence.

While I stood there, my gun still resting against the tree, deeply chagrined at what I supposed the last chance for game that day, for I was too much fatigued to track farther, I heard the brush crack, and in an instant the largest buck with the largest horns I ever saw, stopped not more than thirty or forty feet from me. While I could distinctly make out his form, the bushes were too thick to allow the hope that I could reach him with a bullet. My only chance was to wait till he should pursue his course, which would bring him through a short space where the bushes were lower, and I might get a shot on the bound when his body would be above them. He stared at me some seconds, as if something told him of danger; but at length he seemed to become reassured, and bounded along in his original course as if he was in somewhat of a hurry, but not in manifest alarm. As

I anticipated, on his third or fourth bound he gave me a chance, and I fired as he was descending. His heels flew into the air with a snap as if his hoofs would fly off, and he fell all in a heap. There was something in the size of the deer and of his horns, the way in which his hind legs, as quick as lightening, stretched almost perpendicularly in the air, and the mode of his falling, which produced a thrill of delight which I have never before or since experienced. I reloaded as quickly as possible and approached the spot where he fell. The first sight told what was the matter. He had raised himself on his forefeet, and was looking fiercely around for an enemy, every hair on his shoulders and neck standing forward, and his eyes glaring with the ferocity of a demon. All behind his shoulders appeared quite inanimate and as wilted as a rag. His backbone was severed just behind his shoulders. It took another shot in the head to induce him to let me bleed him. By the time this was done, a little old man, with a rifle on his shoulder, made his way through the bushes to where I stood, and looked at my trophy in a most disconsolate way. At length he remarked, without taking the least notice of my salutation, "Well, you have got him." To this manifest truth I assented, and asked him to help *slue* the deer around that he might bleed the better, as he was rather heavy for one to handle. "Excuse me," said he, "I have been following that rascal ever since daylight. I am a good way from home with no time to spare;" and away he hurried before I had time to offer to divide the venison with him. Probably that is not the only instance in which one has lost a supper by being in too great haste.

Although the deer had his attention arrested by the scent, and in full view of my entire form, and of the dog standing at my feet, yet from not seeing the least motion, he could not make us out.

THE FAUNA OF MONTANA TERRITORY.

BY J. G. COOPER, M. D.

(Continued from page 600, Vol. II.)

II. BIRDS.

RICHARDSON'S PEWEE (*Contopus Richardsonii*).

FLYCATCHERS (*Empidonax pusillus*, *obscurus*, and *minimus*). These being the species found at Fort Bridges, I suppose one or more of them to have been among the small flycatchers I saw in the mountains. They were exceedingly shy, and though I shot one or two I did not find them, as they fell or hid among thick bushes.

SWAINSON'S THRUSH (*Turdus Swainsonii*). I heard the low call note of this bird in the early morning and evening throughout the mountains, but rarely saw it, as it was very shy and watchful,—more so than *T. ustulatus* on the west coast. Its note and habits were otherwise similar, but I heard no song from it on account of the late season. They were migrating south in September, and common at Cœur d'Aleñe Mission up to the 22d. Near Fort Colville I also saw this or *T. ustulatus* still later.

ROBIN THRUSH (*T. migratorius*). Not abundant, but seen all along the route except in the dense forests. At Milk river I found a nest, with eggs, built in a split trunk of a half fallen tree.

OREGON ROBIN (*T. nævius*). I found this beautiful thrush common near the summit of the Cœur d'Aleñe Mountains about September 10th, frequenting the exceedingly dark and damp spruce forests, which seemed to be its favorite summer residence as at the mouth of the Columbia river. I was surprised to find many of them about Fort Vancouver as early as October 28th, where I did not see them in 1853 until December. There had been an uncommonly early fall

of snow on the Cascade Mountains, which probably drove them down.

EASTERN BLUEBIRD (*Sialia sialis*). I noticed this species at the mouth of Milk river, and as this is within sight of the first range of mountains, their base may be considered as its western limit. I saw it also near Fort Laramie in 1857.

ARCTIC BLUEBIRD (*S. arctica*). I saw a few of this species on the eastern slope of the Rocky Mountains only, and at a high elevation. I have no doubt, however, of its also frequenting some parts of the western slopes, and Nuttall says that he saw it at Fort Vancouver in the winter. It is more shy and silent than either of the other species.

WESTERN BLUEBIRD (*S. Mexicana*). None of the Western Bluebird were seen until reaching Spokan river, north and west of which it is found wherever there are trees, shunning only the dense forest.

RUBY-CROWNED WREN (*Regulus calendula*) and GOLDEN-CROWNED WREN (*R. satrapa*). Seen in small numbers throughout the Rocky Mountains.

WATER OUZEL (*Hydrobata Mexicana*). I was surprised to find this Ouzel scarce in the Rocky Mountains, having seen none myself, and only one being observed by Capt. Floyd Jones, whose attention was attracted by its peculiar habits. This was just east of the Cœur d'Aleñe Pass.

MACGILLIVRAY'S WARBLER (*Geothlypis Macgillivrayi*). Young birds and old ones in fall plumage were common all across the Rocky Mountains, even near the summits, but I saw none in the dense forests of the Cœur d'Aleñe Range, which they seem to avoid as they do those of the Coast Range in Washington Territory.

WATER THRUSH (*Seiurus Novæboracensis?* No. 70). Hell Gate river, August 24th.* Though smaller than the average, this specimen agrees closely with some in Baird's Report from Pennsylvania and Florida. I found it pretty common in the

* Length, 5.75; extent, 9.25; wing, 2.87; Iris and bill, brown; lower mandible and feet paler.

Rocky Mountains, as far west as the Cœur d'Aleñe Range, and I noticed no difference in its habits or in its single call-note of this season, from those of eastern specimens. I did not notice it along the Missouri, nor did Dr. Hayden collect it above Vermilion river, near the Iowa line.

Audubon's Warbler (*Dendroica Audubonii*). This was the only bird of the genus I saw. It was very common throughout the mountains, and I have found it in every portion of the country west of them, even where there was scarcely a bush to be seen.

Redstart (*Setophaga ruticilla*). The Redstart was one of the commonest birds in the Missouri bottom-lands, and I found several of its nests between Fort Union and Milk river, in June. It continued pretty common as far west as the Cœur d'Aleñe Range.

Western Tanager (*Pyranga Ludoviciana*). Less common than near the coast, but reaching the east base of the Rocky Mountains, though not seen down the Missouri river. The specimen preserved is larger than any measurements recorded by Baird.

Barn Swallow (*Hirundo horreorum*). The Barn Swallow occurs in small numbers entirely across the Great Plains of Nebraska, but seems to limit its summer residence to tracts where it can find caves in which to build, as I saw no sign of its nests about the trading posts, where the more abundant Cliff Swallow has full possession of every available position for a nest. I saw the former, however, near Fort Benton in July, and in some parts of the Rocky Mountains afterwards.

Cliff Swallow (*H. lunifrons*). Swarms of this species occurred at every suitable cliff along the Missouri, and across the Rocky Mountains to Cœur d'Aleñe Mission, where they remained until September 18th.

Swallow (*H. bicolor* or *thalassina?*). I saw a flock of one or the other species flying over Bitterroot river, about September 1st, and remarked them because I had not seen

any species for several days in that thick-wooded valley (near the crossing), and supposed all the Swallows had gone South. Though both of these probably inhabit that region, I am not sure that those seen were of either species, as they had a strange look, and flew too high to be shot or closely observed. They were white beneath, with the tail a little forked, and may possibly have been Bank Swallows.

Cedar Bird (*Ampelis cedrorum*). The Cedar Birds were very abundant in the open pine woods of the main Rocky Mountains, and evidently had nests in August, as they were scattered, and commonly seen searching for insects among the pine foliage, etc. Also common at Cœur d'Aleñe Mission. I saw nothing of the larger Waxwing, which I have since found as far South as Fort Mohave, N. W., January 10th, 1861.

Townsend's Flycatcher (*Myiadestes Townsendii*). I saw only the specimen preserved, which I shot at the eastern base of the pass over the Cœur d'Aleñe Mountains. It was there pursuing insects from bush to bush in a small prairie or "opening," silent, and in every respect resembling the Pewee and other birds of that family in habits. I have remarked the same of *Phainopepla nitens* of Southern California, a bird closely related to this, and in habits very unlike the Waxwings, at least in winter. The Shrikes, however, resemble these birds more than the Waxwings or the Vireos, with which Baird associates them. The tarsal scales would remove both, and the Waxwings also, from the order of Oscines, and I never heard them sing. (No. 103 is in plumage apparently young, and undescribed.)

Shrike (*Collyrio excubitoroides?* or *elegans?*). Both in 1853 and this year, I saw Shrikes on the Columbia Plain in October, which seemed to me to be quite different from *C. borealis*, and to resemble *C. excubitoroides* which abounds through the plains of Nebraska and across Oregon to California. They were so wild that I could not get near them, and in habits, flight, etc., resembled the latter. *C. elegans*

was furnished to Swainson by the Hudson Bay Company, and was most probably therefore killed north of the Columbia river. No specimen exactly like it has been lately obtained.

Northern Shrike (*C. borealis*). I shot a specimen, the only one I saw, at Fort Dalles, October 15th,—early in the season for it to appear even in that latitude. It was savagely attacking Jays and Magpies, driving them before it, but it did not kill any birds while I observed it.

Vireo (*Vireo olivaceus? V. Bartramii* Swainson?). I found this species quite common from the eastern base of the Rocky Mountains to that of the Bitterroot Range, and in habits found it exactly like the eastern *olivaceus*. As it is larger than that mentioned by Swainson, his specimen was very probably, as Baird suggests, of the next species, especially since this is found unchanged at Fort Bridges, Utah.

Warbling Vireo (*V. gilvus*). Rather less common than the preceding in the Rocky Mountains, though very common west of the Cascade Range. I noticed nothing new in its habits. — *To be continued.*

AN AFTERNOON IN NICARAGUA.

BY WILLIAM H. DALL.

When the agent of the Central American Transit Company announced to us, that on account of the low water, we might be detained a day or two at Greytown, we did not consider ourselves unfortunate by any means. A collecting party was quickly organized, and, after partaking of fried plantains and "tortillas," with a cup of coffee from the hands of a señorita very much the color of the beverage just mentioned, each one started out prepared to make the best of the six hours of daylight remaining, by dispersing into the bushes in search of specimens of all kinds. Previous, how-

ever, to our departure, a person showed us a bottle of whiskey, which he asserted contained the most poisonous reptile extant. On examination it proved to be a specimen of a very beautiful snake, banded with red, black, white and cream-color, and of a genus (*Elaps? euryxanthus* Ken.) which is perfectly harmless. In vain we pointed out the jaws, totally destitute of fangs, and almost toothless, and were again assured that it was the far-famed "coral snake," of which the bite was inevitably followed by a bloody sweat, and death in most awful agonies. Not wishing to waste time in discussing the point, we separated, each striking into the heavy growth of bushes back of the town, or following the sandy beach to the entrance of the lagoon, now no longer a harbor.

I pushed into the jungle by a narrow foot-path winding among the trees, which, with the vines and even the grasses, appeared each one to vie with all others in the production of hooks, thorns and prickles. The mosquitoes, too, were by no means idle. The path soon brought me to the edge of a small lagoon, surrounded with trees and vines, and presenting a most beautiful scene. Here and there on the sunny side of a log, were small lizards with their sides brightly banded with metallic blue or green, chestnut and black. Everything was quiet, but a mellow humming told of insect life hovering among the green leaves.

The most noticeable among the many plants which were growing in the water, was a gigantic Sagittaria, rising above the water six or eight feet; its beautiful pointed leaves and white flowers bearing a great similarity to the common Arrow-head of the Massachusetts ponds. Rich crimson orchids were to be seen growing in the branches of the higher trees; but, after considerable exertion, having dislodged one of them, I was disappointed by finding it coarse and unattractive on a nearer inspection. Leaves of a nymphaceous plant, like our yellow pond-lily, but no flowers, were seen on the surface of the water.

The mosquitoes soon put an end to my pleasure in surveying the beauty of this secluded spot, and I made my way with some difficulty between the wild pineapples, which, bearing no edible fruit, add a positive evil to their deficiency of good, by pushing in every direction their sharp, saw-like, and inflexible leaves.

Reaching an open spot I saw a beautiful bird balancing himself on a slender twig, and occasionally uttering a plaintive note, of no great melody, but far from disagreeable, as is the case with many tropical birds. His body was a rich chestnut brown, and the underside of the tail of a bright golden hue. A lucky shot added him to my collection. It was the Inca Bird (*Ostenops Montezuma*); the "Oro-pendula" or Golden-tail of the Spaniards. Another moment and a flash of fire seemed to pass from one bough to another; my gun was brought into requisition again, and I brought down a fine male Fire Bird (*Ramphoceles passerina*), probably one of the most beautiful of American birds. The body is of the most brilliant scarlet, and the wings and tail jet glossy black. Others of our party obtained another species (*R. icteronata*) almost equally beautiful, where the most brilliant yellow on the rump and back takes the place of scarlet; while still another (*R. sanguinolenta*) glories in a dress of the richest velvety maroon.

It was growing rather dark in the dense thicket, and I retraced my steps towards the beach. On my way I added several other interesting birds (*Momoti*) to my collection, and one, a dark-colored, sad-looking bird, which proved the greatest prize of all, being a new species, afterwards described by Mr. Lawrence as *Spermophila badiiventris*. Reaching the edge of the wood, I found a small brook between me and the sand. The banks being low, were covered for several rods on the farther side, with a succulent plant of the order *Portulacaceæ*, with round leaves about half an inch in diameter. I noticed little well-beaten paths, about one inch wide, running all through this bed of green,

and stopped to discover if possible what made them. Some were wider than others, and on one of these I soon discovered a foraging party of ants. They were of two species, one being a rather small black ant, with weak jaws or nippers, and the other nearly twice that size, each bearing a formidable pair of prolonged mandibles or jaws, and as near as I could see there were no two with jaws of exactly the same size or shape. The small ones were evidently slaves. They were marched between two rows of scouts, and if a slave attempted to pass the line, he was speedily seized and put back, not very gently, into his place. I watched their motions with a great deal of interest. The "soldiers," after searching till satisfied for a rich succulent leaf, bit it off and gave it to a slave, who immediately marched off with it in a contrary direction to the main body. Following the train for a rod or two, I came to the brook just where it had made an abrupt bend, with an eddy in it. Here the banks were rather high, a moderately brisk sea-breeze was coming from the shore, and just here a small tree about two inches in diameter had fallen across the brook. On this pole were myriads of ants going in different directions. Those above, each with a leaf in his mouth, were crossing to the wooded side. Those on the underside were empty-handed (or mouthed), and were coming from the woods. Here I noticed a curious thing. The leaf, being larger by far than its bearer, acted as a sort of sail to catch the wind, and I saw many an unfortunate slave-ant, after struggling with all its might to save its precious load, finally let it go in self-defence, and immediately join the excursionists on the lower side of the pole, going back for another leaf. In the eddy before mentioned, there was at least a bushel of these leaves which had been blown away from their bearers.*

The red light of the setting sun warned me to be stirring homeward; and, picking up a few Apple-snails (*Ampullariæ*), I walked briskly towards town. Stopping for a moment to

* Probably a species of Œcodoma. — EDITORS.

turn over a bit of plank in search of land shells, to my great delight, there lay snugly coiled up, one of the famous "coral snakes!" Taking his head between my finger and thumb, I let him coil around my wrist, and made the best of my way to the office of the Railroad Survey, determined to prove the harmless nature of the pretty little creature. Upon producing it, however, two of my English friends disappeared through the window, and the one before mentioned reaching the loft over head, in a great hurry, seized an empty bottle (there were plenty of them there), and adjured me in forcible language to depart and take the snake with me, on pain of several things too disagreeable to mention. Doubting the efficacy of argument in the premises, I consigned the snake to an alcohol tank, and took the story to the supper table, where it afforded us a fund of amusement for the evening, and was by no means the most disagreeable reminiscence of my afternoon in Greytown.

REVIEWS.

Travels in the East Indian Archipelago.*—The object of Prof. Bickmore's travels was the collection of a set of shells from the island of Amboina and its immediate neighborhood. In this Mr. Bickmore seems to have fully succeeded, and thanks to his energy and perseverance, we now have in this country a full suite of the species first described by Rumphius. The present volume merely states this object and describes the mode of its attainment. Otherwise it is a diary of the author's daily experience among these tropical islands, in which mountains, lakes, rivers, plants and animals, incidents and accidents, are all described as they happened. The coast tribes are said to be of a mild disposition, but those of the interior mountainous parts of the different islands, wild and savage; in some cases cannibals. The ethnological characteristics of the different tribes are given whenever practicable, and the details of their dress, and habits of life sometimes accompanied by photographs and drawings of great value.

"All the natives (Malays, of Java) are remarkably short in stature, the

*Travels in the East Indian Archipelago. By Albert S. Bickmore, M. A. 8vo, pp. 553. Sent to us by H. A. Brown & Co., Boston.

men averaging not more than five feet three inches in height. The head is somewhat lozenge-shaped, the cheek bones high and prominent, the mouth wide and the nose short,—not flat as in negroes, or prominent as in Europeans." "The men have but a few straggling hairs for beards, and these they generally pull out with a pair of iron tweezers. The hair of the head in both sexes is lank, coarse, and worn long." The different kinds of trees and their fruits are graphically described, and the drawings which illustrate them are characteristic, especially that of the Bamboo. We have space to quote but one or two of the more interesting passages, since these travels extend to many islands, each of which are in turn described; while their political history, the character of their people, agriculture, and geological features of the countries, all pass in review. The author thus describes the different zones of vegetation in the island of Java: "Above one thousand feet, palms, bananas, and papilionaceous plants become fewer, and are replaced by the lofty fig or 'waringin,' which, with its high top and long branches, rivals the magnificent palms of the sea-shore." Liquid amber, and the cotton-wood, also appear, and orchidaceous plants and ferns in considerable numbers. "Over this region of the fig, comes that of oaks and laurels. Orchidaceous plants and melastomas are more abundant here." "Above six thousand feet are Rubiaceæ, heaths, and cone-bearing trees," succeeded by the zone of small ferns, lichens, and mosses.

Java is the Cuba of the East Indies. "In each there is a great central chain of mountains. Both shores of Cuba are opposite small bodies of water, and are continuously low and swampy for miles, but in Java only the north coast borders on a small sea. This shore is low, but the southern coast, on the margin of the wide Indian Ocean, is high and bold, in accordance with the rule that the higher elevations are opposite the greater oceans."

The islands of Lontar, Pulo Pisang, and Pulo Capal, are described as the remnants of the wall of a sunken crater, the length of which was four and a half, and the breadth not less than three and a half miles. The active volcano of Bromo, within the limits of this crater, was ascended and described, Mr. Bickmore nearly losing his life in the attempt. The grave of Rumphius, marked by a small square pillar, is still in existence, and was found and described by the author.

The many observations and facts which the author has brought together, would have been made more available, and more valuable to the scientist, if the work had been less diffuse. The number of pages might have been lessened without detracting from its popular character, or the freshness and beauty of many of the descriptions of the fruits and natural scenery.

Bee Keeping.*—In this pamphlet the author describes what he claims to be "a new system of bee keeping, adapted to the habits and characteristics of the honey bee; with descriptions of, and directions for mana-

* A New System of Bee Keeping. By D. L. Adair. Cincinnati, 1867. 8vo, pp. 74.

ging bees in the section bee-hive. embracing also improved methods of artificial swarming, whereby the business of bee keeping is rendered more profitable and pleasant." The rearing of bees is becoming a source of profit to farmers, and though without a practical acquaintance with the subject, we should judge it to be for the interest of every bee keeper to own this little manual, and to learn the merits of the section bee-hive described and figured in it.

THE EXTINCT FLORA OF NORTH AMERICA.*—This pamphlet is the climax of the late controversy between Messrs. Meek and Hayden on the one side, and Profs. Marcou and Heer on the other. This controversy made us acquainted with the fact that the familiar forms of the poplar, oak, sassafras, willow, etc., lived in the Cretaceous period; and in the present pamphlet the author, who was also one of the first to assert this truth, reviews the main points of the evidence, and brings forward a numerous list of new species. The Cretaceous period, though the continent had a different outline from the present, and though it was inhabited by animals very distinct from ours, had forests resembling in many of their characteristic trees those of to-day. "Salisburia, Sabal, and Cinnamomum, etc., are indicative of a warmer climate," and are found on the West coast of the continent. "Possibly these genera may hereafter be detected in the plant-beds of Kansas, Nebraska, and New Mexico, but as yet we have no intimation of their existence, and there is nothing now known in the Cretaceous flora of that region which gives it a tropical or even sub-tropical character."

"It will be remembered that this vegetation grew upon a broad continental surface, of which the central portion was considerably elevated. This would give us physical conditions not unlike those of the continent at the present day; and it would seem to be inevitable that the isothermal lines should be curved over the surface somewhat as at present. It may very well happen, therefore, that we shall find the palms and cinnamons restricted to the western margin of the Cretaceous continent. It will be seen by the notes now given of the Tertiary flora of our continent, that, at a later date, palms grew in the same region where these Cretaceous plants are found; but cinnamons and other tropical plants seem to be entirely wanting in the Tertiary flora of the central part of the continent, while on the west coast both palms and cinnamons lived during the Tertiary period as far north as the British line. We have therefore negative evidence from the facts, though it may be reversed at an early day by farther observations, that the climate of the interior of our continent during the Tertiary age was somewhat warmer than at the beginning of the Cretaceous period, and that during both the same relative differences of climate prevailed between the central and western portions that exist at the present day."

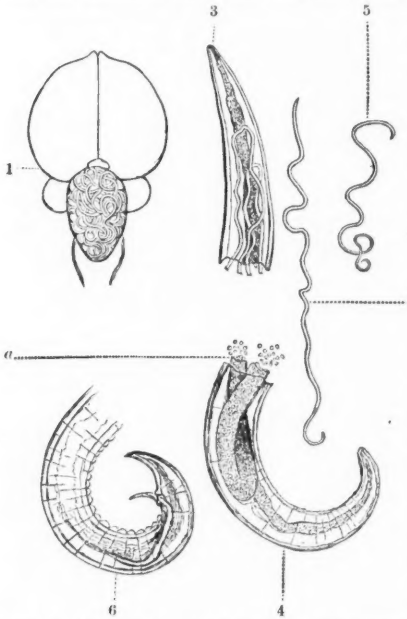
PARASITIC WORMS IN THE BRAIN OF A BIRD.†—One of the most obscure subjects in zoölogy is the history and development of animal parasites, and especially those which take up their abode in the brain of different animals. Prof. Wyman has detected a species of "round worm" in the brain of seventeen out of nineteen specimens of the *Anhinga* (Snake-bird

* Notes on the Later Extinct Floras of North America, with descriptions of some New Species of Fossil Plants from the Cretaceous and Tertiary Strata. By Prof. J. S. Newberry, of Columbia College, New York. 8vo, pp. 76.

†On a Thread-worm infesting the Brain of the Snake-bird." By Jeffries Wyman, M. D. (From the Proceedings of the Boston Society of Natural History, October 7, 1868). 8vo, pp. 7.

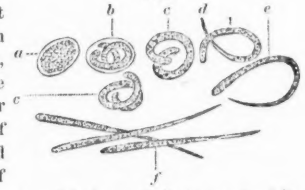
or Water-turkey) shot in Florida, thus proving that "their presence in the cranial cavity might be called the normal condition of this bird." The author states, that

"Parasites have occasionally been found infesting the brain or its membranes in man and animals, but far less frequently than in the other regions of the body. The number of species thus far observed is quite small, and are chiefly referable to the genera *Taenia*, *Filaria*, *Trichina*, and *Diplostomum*, and confined almost wholly to man and domesticated animals, such as the sheep, reindeer, dromedary, horse and ox; and among wild animals to the chamois, roe-buck, and a few others. That they have not been more frequently seen in the wild species is without doubt due to the fact that the brains of these have been so seldom examined for the purpose of detecting them."



These worms, "which correspond very nearly, if not identical with the *Eustrongylus papillosus* Diesing," were found in every instance coiled up on the back of the cerebrellum (Fig. 1), their number varying from two to eight. Fig. 2 is the female, and Fig. 3 represents the head, much enlarged, and Fig. 4 the end of the body, showing the oviduct and eggs (*a*). The male, Fig. 5, is only one-half as thick as the female, and the end of its body, Fig. 6, is always more closely coiled than in the female. This worm is viviparous, the young hatching in the oviduct. The development of the young is sketched in Fig. 7; *a*, is the egg; in *b*, containing the embryo, which leaves the egg in the form indicated at *c*, *c'*. As they descend lower down in the oviduct, they straighten themselves, as at *d* and *e*, until they become of the form indicated at *f*. "Their earlier stages are unknown, but the analogy of the Gordiaceous, and other worms, lead to the supposition that the parasite of the brain of *Anhinga* is one of the migratory kinds, and that a part of its life, at least, is passed in a locality quite different from that in which it was detected. The manner in which the transfer of the embryo is effected

Fig. 7.



outwardly to some other animal, or the water, and then back to another *Anhinga*, is wholly unknown."

Scientific Opinion.*—A weekly journal showing the progress of science in all its departments, is a most welcome publication. It is edited with great ability, and its editorial reviews deserve especial notice for their plain speaking and candor. No other journal known to us reports so promptly and fully the Proceedings of Scientific Societies, especially the German and French. Both this and the Paris *Cosmos*, a favorite exchange with us, will doubtless have a wide circulation in America, as science is attaining such proportions that we on this side of the water must receive weekly scientific intelligence from Europe.

Fauna of the Gulf-stream at great depths.†—This is the continuation of a similar paper by the same author previously reviewed. The utmost depth reached with the dredge was 517 fathoms, or 3102 feet, or over 1000 feet beyond the late researches near Spitzbergen. The bottom has been divided into three regions, extending in zones around the Florida reefs:—1st, From the reef outwards four or five miles to the depth of 90 fathoms; 2d, From 90 to 250 or 350 fathoms; 3d, The bottom of the channel which does not much exceed 500 fathoms. The first region is barren, and covered only by dead and broken shells, showing that the fauna of the reef itself does not extend seaward. The second is "rich in animal forms," and is particularly interesting to the geologist. It is a limestone, gradually increasing by the accumulation of the calcareous remains of Corals, Echinoderms and Mollusks. "These debris are consolidated by the tubes of Serpulæ, the interstices filled up by Foraminiferæ, and smoothed over by the Nullipores. It is supposed by the author that this will eventually thicken until the water is shallow enough for the Astreans and Madrepores to begin their work of founding a new barrier similar to the existing reefs. This limestone is filled with recent fossils, furnished in great part by the animals now living on the bottom, but "a few contribute by sinking after death from the higher regions of the superincumbent water (teeth of fishes and shells of Pteropods), and others are brought by currents from littoral regions (bones of the Manatee, and fragments of littoral plants). All the branches of the animal kingdom, so far as their marine carnivorous orders are concerned, are abundantly represented in this region, but it is destitute of plants.

The third region is sparsely inhabited by a few Mollusks, Radiates, and Crustaceans, but the peculiar animal is the microscopical Globigerinæ whose siliceous shells have covered the bottom of the channel with a thick deposit. The deep sea animals of the second and third regions are of smaller size than allied forms of the littoral zone. "The only exception is an Echinus, which is nearly of the average size, and an Actinia.

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*Scientific Opinion. A Weekly Record of Scientific Progress at Home and Abroad. Part I. December; II. January, 1869. 4to. Monthly Parts, 1s. 6d. London, 1869. 4to, 3 columns.

†Bulletin of the Museum of Comparative Zoology, No. 7. Contributions to the Fauna of the Gulf-stream at great depths. (Second series.) By L. F. Pourtales, Ass't U. S. Coast Survey.

The prevailing colors are white, pink,—sometimes playing into orange,—and a pale green. Blue was only seen in a small incrusting sponge. What proportion of light reaches a certain depth we shall try to determine during our next explorations. It is certain, however, that the deep sea animals have generally well-developed eyes, larger if anything than those of their congeners of shallow water."

THE GEOLOGICAL SURVEY OF ILLINOIS.*—Prof. Worthen announces that the Carboniferous system attains a maximum of 2500 feet in this State, and contains ten seams of coal, six of them in the lower, three hundred feet of the true coal measures being of workable thickness. The whole series is exposed in the banks of the Illinois, which cuts diagonally across these beds for more than a hundred miles from north-east to south-west.

Prof. Worthen points out from theoretical data what may possibly prove to be a very serious mistake in Prof. Owen's estimate of the thickness of the coal measures in Kentucky. If it prove a true criticism, Kentucky is not so rich by one half in workable coal seams as she has been represented. Prof. Worthen thinks that Prof. Owen mistook two outcroppings of the same sandstone for two different layers, and that these two, which are distinguished as the "Anvil-rock Sandstones," and the "Mahoning Sandstone," in the Kentucky section, are identical. If this be so, the series of coal seams between the latter and the former, do not overlie the Mahoning Sandstone, but are merely similar or duplicate beds, occurring in the same geological horizon. "The product of our coal mines for the past year (1867) according to the most reliable statistics, is fully 1500000 tons." "There is, perhaps, no other area of equal extent in the United States where coal is so easily obtained with a moderate expenditure of capital as in the Illinois Coal-field." The strata are undisturbed; their inclination from the western border to Springfield is not over seven feet to the mile, and the principal seams are accessible in the central parts of the State, at from two hundred to four hundred feet. Our space only permits us to name the counties, the geology of which is fully described. They are Alexander, Union, Jackson, Perry, Jersey, Greene, Scott, Washington, Clinton, Marion, Jefferson, Cook, and La Salle Counties.

The second part, by Messrs. Meek and Worthen, is devoted to Palæontology, and contains among much interesting matter, full descriptions and figures of the remarkable Carboniferous crustaceans from Mazon Creek, which were first made known by this survey. Mr. Scudder describes the fossil insects, and gives many interesting details. From these it appears that we have from the Grundy County Carboniferous rocks, besides those described in Vol. I, one species of Eurypterus and two Crustaceans allied to the common Limulus; two Isopods, and two Macrurous Decapods. Among insects there are two Myriapods, one of enormous size, two species of Neuroptera belonging to two genera, and two species

*Geological Survey of Illinois. A. H. Worthen, Director. Vol. III, Geology and Palæontology. 4to, pp. 574. With twenty plates and numerous illustrations.

allied to the Scorpions, and one whose affinity is doubtful. The species formerly described and figured as a caterpillar in Vol. II, page 163 of the NATURALIST, is now thought, from the study of additional specimens, to be a worm, the hairs on the body being longitudinally striated, and, according to Dr. Packard, resembling those of Aphrodite.

THE ANCESTRY OF INSECTS; FOSSIL INSECTS AND CRABS, IN ILLINOIS.*—Prof. Haeckel, of Jena, has been speculating as to the ancestors of the articulates. He considers the ancestral form of the crustacea as a zoëa-like creature, resembling the larval or zoëa-stage of the crab. As to the ancestor of the air-breathing, terrestrial articulates (insects, spiders and centipedes), he proposes the theory that it was a zoëa which, probably, about the Devonian Period, adopted a terrestrial life. As this is an age of speculation, we should suggest, that the ancestors of the insects (including the six-footed insects, spiders and myriapods) must have been worm-like and aquatic, and when the type became terrestrial we (still speculating) would imagine a form somewhat like the young Pauropus (Fig. 1) discovered by Sir John Lubbock in England, which combines in a remarkable degree the characters of the myriapods and the degraded wingless insects, such as Smynthurus, Podura, etc. Some such forms may have been introduced late in the Silurian period, for the interesting discoveries of fossil insects in the Devonian of New Brunswick, by Messrs. Hartt and Scudder, and those discovered in the lower part of the Coal Measures, at Morris, Illinois, and described by Messrs. Meek, Worthen and Scudder, reveal carboniferous myriapods, *Euphorberia* (two species), more highly organized than Pauropus, and a carboniferous scorpion (Buthus?), closely resembling a species now living in California; together with another scorpion-like animal, *Mazonia Woodiana;* while the Devonian insects described from St. John, by Mr. Scudder, are nearly as highly organized as our grasshoppers and May-flies. Dr. Dawson has also discovered a well developed milleped (*Xylobius*) in the Lower Coal Measures of Nova Scotia; so that we must go back to the Silurian period in our search for the earliest ancestor, or (if not of Darwinian proclivities) prototype, of insects. As to the earliest Crustacean being a zoëa-form, have we not among the earliest known Crustaceans, the Trilobite (*Paradoxides*) and several allied forms of Lowest Silurian age, whose larval form was, undoubtedly, more or less worm-like, as are certain degraded marine Pill-bugs (*Bopyrus*) of the present day? Messrs. Meek and Worthen describe fossil Shrimps (*Anthropalæmon*) and Sand-fleas, in the Lower Coal Measures of Illinois, associated with a large Eurypterus, being a gigantic shrimp-like animal; a Trilobite (*Euproops Danæ*) resembling our

Fig. 1.

* "The Palæontology of Illinois. Articulate Fossils of the Coal Measures. (Advance sheets of the Report of the Illinois State Survey.) By Messrs. Meek, Worthen and Scudder. September, 1868. 8vo.

Horse-shoe Crab; and several insects are described by Mr. Scudder under the name of *Miamia Danæ*, and *Chestoles lapidea* (a neuropterous insect allied to Miamia); also part of a Cockroach, and a Harvest-man or Daddy-long-legs, allied to, but lower than the spiders, with several other undetermined remains of insects. With such recent discoveries of so highly organized articulate life in rocks so ancient, and with the late discovery of a land-plant in the lower Silurian rocks of Sweden, it seems premature to even guess as to the ancestry of either these or their living representatives.

The Book of Birds and the Book of Beasts.*—From an examination of their contents we do not hesitate to say that they form a valuable addition to our popular-science literature. The engravings are numerous and well done. The subject is treated in a clear and interesting manner, and with the typography and binding, form elegant volumes for the young.

Cecil's Book of Insects.†—A very pleasantly written book, containing chapters about Ants, Bees, Spiders, Dragon-flies, Wasps, Locusts, Mosquitoes, Beetles and Butterflies. The illustrations are as a whole very good, and the stories about insects are reliable and well calculated to interest the young, and induce them to observe the habits of insects and form collections of them.

List of the Lepidoptera of North America.‡—The American Entomological Society, which has issued six volumes of Proceedings, and has entered on the second volume of Transactions, all beautifully illustrated, and indispensable to the study of our insects, and we may add, published remarkably cheap, is now issuing, in Parts, a list of our Butterflies and Moths, by Messrs. Grote and Robinson. The present Part embraces the species of Sphinges, Ægerians, the Thyridæ, Zygænidæ, and the Bombycids, or Silk-worm family, found north of Mexico. The catalogue gives the most important synonyms, and when finished, will be an invaluable book of reference to students of this group of insects.

We should here speak of the remarkable energy shown by the members of this young society, which was incorporated in 1862. With but a single salaried officer it started at once under very adverse circumstances, and established a printing office in its own hall, and issued annually a volume of Proceedings, rivalling in interest and value those published by the Entomological Societies of London, Paris, Berlin and Vienna. Not content with this, its members edited "The Practical Entomologist," designed to acquaint farmers with the habits of the injurious insects, distributing from 5000 to 8000 copies each month, gratuitously the first year, and for a mere trifle the second, when it was obliged to suspend its

* Cecil's Books of Natural History; Cecil's Book of Beasts; Cecil's Book of Birds. By Selim H. Peabody, M. A. Chicago: Clarke & Co. 12mo.

† Cecil's Book of Insects. By Selim H. Peabody, M. A. Chicago: Clark & Co., 1868. With eleven full-page illustrations. 12mo, pp. 228.

‡ List of the Lepidoptera of North America. By A. R. Grote and C. T. Robinson. Part I. Philadelphia: American Entomological Society. September, 1868. 8vo, pp. 16.

publications for want of means. The Society in a circular recently issued, asks the pecuniary aid of all interested in science. We hope that the citizens of Philadelphia, who have already done so much for science, will not let one of its most useful institutions of learning suffer for want of the funds asked for in the present circular, for the society seeks for a mere pittance, such as a few of the wealthy men of that well-to-do city could easily grant. We hope all our entomologists will lend their aid to a society which has done so much for the furtherance of their favorite study, at least by subscribing to its Transactions, which are published at $3 a year.

Catalogue of North American Grasshoppers.*—A very carefully prepared list of all the Orthoptera of our country. The author states in the preface that the arrangement, both of genera and species, is a purely alphabetical one. "The list is not in any sense a synonymical one, involving the expression of personal views, but a hand-book for the student, in which is collected every reference to any species of orthoptera stated to have been found on the continent of North America, or in the West Indies,—a groundwork upon which he may erect a superstructure of his own." Mr. Scudder is also preparing a monograph of the orthoptera for publication by the Smithsonian Institution, and desires specimens of this neglected group of insects. A new arrangement of the families, and a more natural one than has been offered before, is appended.

The Progress of Zoölogy in 1867.†—To the American student these yearly volumes are an indispensable aid. They contain lists of every paper or work relating to zoölogy, with a brief analysis of their contents. How any working naturalist, without a large library at hand, such as scarcely one institution in this country affords, can do without these reports, we do not see. "The fourth volume of the Record forms a systematic guide-book to about 36,400 pages of the zoölogical literature published (with the exception of a very small part) within the year 1867. This number has never been reached in any preceding year, and corresponds to an increase in the number of authors; an unusually great activity appears to have prevailed in the study of Mammals, Birds, Mollusks, Neuroptera and Orthoptera."

The publisher, Mr. Van Voorst, deserves the thanks of zoölogists the world over, for the liberal spirit he has manifested in undertaking the publication of a work which he prints at a considerable pecuniary sacrifice. The British Association, however, made a grant of $500 for the present volume and the succeeding one. The volume is issued in three parts, viz.: that of Vertebrates, of Entomology, and of Mollusks, Crustaceans and Lower Animals, so that the specialist can at a cheap rate supply himself with a report on his own branch.

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*Catalogue of the Orthoptera of North America, described previous to 1867. Prepared for the Smithsonian Institution by Samuel H. Scudder. Washington: Smithsonian Institution, Oct., 1868. 8vo, pp. 89.

†The Record of Zoological Literature, 1867. Vol. IV. Edited by A. C. L. G. Gunther, M. D., etc. London: Van Voorst. 1868. 8vo, pp. 678. The volume, or the separate parts, can be furnished by the "American Naturalist Book Agency."

NATURAL HISTORY MISCELLANY.

BOTANY.

DOUBLE FLOWERED SARRACENIA.—In the summer of 1867, I found a specimen of the *Sarracenia purpurea*, double, in East Hampton, Mass. In the summer of 1868, I found a specimen of the *Geranium maculatum*, with all the parts of the flower of a pure white.—E. S. MILLER, *Wading River, N. Y.*

ZOÖLOGY.

THE BREEDING HABITS OF BIRDS are subject to so great variations, that it is not safe to give the practices of a few individuals as being the general habits of the species. Any one who has given much attention to the subject, must be convinced of this, both from his own experience and that of others who have written upon the subject. And there can be no doubt that the apparent discrepancies of writers are frequently the result of founding conclusions upon insufficient data. Take the Kingfisher as an example. In a number of cases which have come under my observation, the passages leading to the nests were invariably straight, so that there was no difficulty in reaching the extremity of the excavation with a straight stick. This agrees with Dr. Wood's experience as given in the September number of the NATURALIST. Mr. Samuels, in his "Birds of New England," says they excavate a "winding hole." Mr. Fowler and Mr. Endicott, in the NATURALIST, describe them as being "in the form of an elbow." But while all these descriptions are doubtless correct, is it correct to state in general terms that the passage is in the form of an elbow, thus implying that this is the invariable, or even general form? One of the nests which I have found had the bottom covered with fish bones, the ejected pellets of the bird, and upon these the eggs were laid.

I have in my collection a set of Long-eared Owls' eggs, six in number. I have not been fortunate enough to find another nest, but should I represent this species as usually laying six eggs, I should probably convey a wrong impression.

While visiting a heronry last spring, on one of the low islands off the coast of Cape Charles, Va., I found a nest of the Clapper-rail (*Rallus crepitans*) built in a bush, and about a foot from the ground. I have seen many nests of this species, but that is the only instance in which I have known the bird to nest elsewhere than on the ground. The land was low and wet, and liable to inundation, which was the probable cause of the bird's departure from the usual habit of the species.

In an article by Mr. Fowler in the September number of the NATURALIST, I find the eggs of the Ruffed Grouse thus described: "The color of

the eggs is yellowish-white, marked with reddish brown spots. Usually the last ones of the litter are without spots, and of a lighter color; a few larger round spots appear to be laid on the surface of the shell and raised above it." To this I would say that I have seen a great many eggs of the grouse, but only a few were marked as thus described. And while the description is true to a certain extent, it may be questioned whether it is applicable to "typical specimens." On the 29th of April, 1865, I found a nest of the grouse, containing nine eggs of a pure white color, with the exception of a few stains, which were soon removed by the application of soap and water. After a time the color changed to a brownish white.

On the 3d of May, 1866, I took three eggs from the nest of a Marsh-hawk. There was no appearance of spots upon them. As I had seen the birds about the place for two weeks, selecting a spot and building their nest, I feel sure that this was the first litter. But last spring I obtained six eggs from a nest, and all were marked with numerous light brown spots and blotches. The same nest was occupied two years previous, thus proving that the marsh-hawk does sometimes occupy an old nest.—C. M. Jones.

The House Wren.—The mischievousness of the House Wren (*Troglodytes ædon* Verrill) is well known. The following incident came under my observation a short time since. A pair of Martins had taken possession of a box that I had erected in the garden for their benefit; had built their nest, laid their eggs, and had commenced setting, when a pair of house wrens, who coveted their neighbor's house, entered it in the absence of the martins, and coolly picked up their eggs one by one, carried them out, and dropped them to the ground below. While engaged in this impudent business, the martins returned, and while going in at one of the entrances of the box, the daring marauders darted out at the other, and alighting on a tree near by chattered noisily, apparently in great glee. The martins, finding that their nest had been despoiled, abandoned the box, which was then duly taken possession of by the wrens, who reared two broods of young hopefuls during the summer, the first about the beginning of June, the second the latter part of July.—M. S. Hill, *East Liverpool, O.*

Destructiveness of the Larva of the Goldsmith Beetle.—In previous numbers of the Naturalist, I ventured the opinion that the Goldsmith Beetle (*Cotalpa lanigera*) was not likely ever to prove a serious pest to the agriculturist. As respects the insect in its beetle state, perhaps this may prove correct; but so far as that opinion may have related to the larva of this insect it must be retracted, as a positive observation lately made must settle this matter forever.

When on a visit in September last to the farm of a celebrated strawberry grower, in Monmouth County, N. J., my attention was directed to certain large patches badly thinned out by, as the phrase went, "the worm." The plants were dead on the surface and easily pulled up, the roots being eaten off below. It was observable that the fields which pre-

sented the worst appearance were all of the same kind of plant; that known as Wilson's Albany Seedling. Besides this there were nine other varieties under culture: Barne's Mammoth, Schanck's Excelsior, the Agriculturist, Triomphe de Gand, Cutter's Seedling, the Jucunda, Pine Apple, Early Scarlet, and Brooklyn Scarlet. While the Wilson stood second to none of these as a prolific fruit-bearer, yet it fell behind them in vigorous plant growth. Hence, while every kind was more or less affected, the other varieties seemed saved by their own growth and energy from a destruction so thorough as was that of the Wilson. These patches were all planted in the spring, and all received the same treatment, the ground being kept open and free from weeds. The amount of the spring planting was seven and a half acres. Of the Wilson's there were three different patches, in places quite separated from each other, and on not less than five different kinds of soil. These patches were among and contiguous to those of the other varieties. While all suffered more or less, the chief injury befell the Wilson's, of which not less than two acres were irretrievably ruined.

An examination turned up the depredator, who was none other than the larva of the Goldsmith Beetle, now engaged in the first one of its allotted three summer campaigns of mischief. These grubs were from the eggs deposited in June, in the well tilled and clean soil, which, I have said elsewhere, I thought the *Cotalpa* preferred to meadow or grass lands. Compared to others, the larva of this beetle is sluggish and easily captured. The black grub of the spring, which is such a pest, attacking almost indiscriminately the early tender plants, inflicts its injuries chiefly in the night, the exception being that of dull and cloudy days. The night's mischief done it descends into concealment at early dawn. Knowing this the wise farmer is in search of it at an early hour, ere the warmth of the sun gives it warning to retreat. But the Goldsmith grub can be taken at any hour of the day simply by scratching away the earth from around the roots of those plants whose dark shrivelled leaves tell of the enemy's presence. It is my belief that this devastation might have been spared by an outlay of from $20 to $30 for labor, of which, under proper direction, much could have been done by children. Therein would have been saved a strawberry crop for the ensuing summer, worth scarcely less than $2500 for, from this same farm the crop of a single acre has been sold for $1500; Then, however valuable such labors are in immediate results, that is but a fraction of their worth as respects the future. These Cotalpa grubs, with all their mischief, had not more than a third of their ultimate size; hence their real ravenousness is yet to come. Besides what a prospect of increase of numbers, should even a moderate share of them reach maturity? Why should not our farmers seek to know something about their insect enemies, and when practicable put forth some energy to meet them as such?—Rev. S. Lockwood.

The Lycosa Spider and its Young.—On the 27th of June I saw a spider descending the trunk of a tree. At a distance of six feet it ap-

peared the size of a pigeon's egg. As soon as it observed me it stopped. Approaching it gradually I could see it crouch, evidently aware that it was noticed. I sharpened a long stick and stuck a pin through the end, and made a strike to empale the body and missed it. What was my astonishment when I beheld a mass of life *uniformly distributed* over the spider; it was all alive. I knocked the spider from the tree to a flat rock beneath; the jar seemed to shake from its abdomen what I soon saw were young spiders, as the rock was *black* with the young ones for a space of six inches in diameter around the old spider. The parent spider did not attempt to run but crouched, and the young began to gather upon her body again. I made a successful hit, and stuck the pin where it held, and the moment it was inserted into the spider's body, the young left at once and dispersed upon the rock. I soon perceived the floating webs passing from the rock to spears of grass on which spiders were quite thick. I should say, at a pure guess, that there were two hundred young spiders, but from the long legs they spread out, they seemed even more numerous. I next noticed spiders upon my coat, hat and collar, and experimented myself with the spider throwing out the floating web. When about six to ten feet from the rock, I saw in the sunlight two webs floating aside of each other, about one foot apart. I saw that the terminus of these webs were but a short distance from my face, and at each end a spider. They moved slowly before the wind, and I watched them for several feet, mounting upwards until lost to view.—G. W. PECK.

[Several species of the genus *Lycosa* are known to have the habit of carrying their young about with them.—EDS.]

THE CATTLE TICK.—The perfect insect found in Texas, gorged with blood and ready to give birth to its young, is much like Fig. 1 *e* of the Moose Tick (NATURALIST, Vol. II, p. 559). They drop from the cattle in the woods, and more frequently along the cattle paths. How long before they appear as "seed ticks" I do not know. It was a prevalent notion among the people that they burst open, nearly the whole interior being composed of the young. These, probably, soon after birth, ascend to the tip of the nearest twig or culm of grass, where they form into a little mass, with their legs extended ready to seize upon any passing animal. When taken off by one they soon commence operations, and in three or four days, I should think, gorge themselves and fall off. They are then, except as to size, much like the full-grown gorged insect. How long a time is required for them to become depleted, or to regain their flattened form, I do not know; but when ready for a new meal or a new transformation (now called "yearling ticks"), they again ascend bushes, but not in clusters; or they crawl over fallen leaves and attach themselves again to animals as chance may offer. They again gorge themselves and fall off as before, to become lean a second time. A third time they fasten to horses, cattle, hogs, dogs, man, and other animals. This seems to be their last time, and, when full, they fall off and become converted to *seed* ticks. This was the common belief, and may be more or less erroneous or defective.

In Cuba I started from St. Jago, with two horses, to go to Havana. Before I had travelled half the journey one of the horses became infested with ticks, the other had none or few. Every day while resting at noon, with a knife I scraped off all the ticks I could see or feel. Notwithstanding all my efforts, the ticks gained upon me so far as regards the horse, but none attached themselves to my person, though I camped most of the nights during the journey, sleeping on the same spots upon which the horses fed. Around the larger ticks were generally found one or more small ones, sometimes many of the latter. I have seen something of the kind in the coast prairies of Texas. Are they viviparous? I never observed anything of the kind in the woodland districts of Texas, and the above mentioned ticks of Cuba were those of the savanna rather than of the timbered parts. — CHARLES WRIGHT.

SUBSTITUTES FOR POLLEN FOR HONEY BEES. — My bees carry into their hives from one hundred to one hundred and fifty pounds of rye meal every spring, during the occurrence of a few warm days before flowers appear. After their appearing in an abundance, the bees will no longer take up the meal. As a consequence of this early and free supply of a material for bee-bread, the queen is stimulated to unusual activity in depositing her eggs, and strong swarms are ready to come out on the bleak shores of Lake Erie by the middle of May, — an occurrence often happening with me since I began to thus feed them, in 1860, but not happening when the meal is withheld. Unbolted rye flour, and also ground linseed or oil-cake may be substituted, but the best rye meal is preferred by the bees, and is perhaps the cheapest. A handful of clean straw should be placed in an open box, standing in the middle of the apiary, and the meal should be scattered over the straw; otherwise many of the bees will get fatally swamped in the meal. — J. P. KIRTLAND, *East Rockport, O.*

HIVE BEES DEVOURED BY HORNETS. — The Paper Hornet (*Vespa maculata*) often enters my nucleus hives, when I am rearing Italian queen bees, and captures the young queen in the midst of her little colony; usually just after she has commenced her first laying. I have seen this depredator enter the small hive, drag out the queen, and fly away with her to the woods. — JARED P. KIRTLAND.

VARIATION IN THE SKELETONS OF WHALES. — M. Van Bambeke has been studying the skeletons of whales, and finds greater variation among them than cetologists seem to believe. The symmetry of the head is rarely complete, since the two sides are generally unlike. There are greater individual differences than usual in other vertebrate animals, and a great number of individuals are necessary for the establishment of species. There are, however, some naturalists for whom any modification, however small it may be, suffices for the creation of new species. The *Tursio* described by M. Van Bambeke, has thirteen ribs on one side, and fourteen on the other, like the skeleton of the Mysticetus, at Brussels. In another Tursio, of Heligoland, Van Beneden has found thirteen, and in a skeleton of the Mediterranean one, he counted only twelve. Van Beneden

has seen a Globiceps with ten ribs, and another with eleven; a Narwhale with eleven ribs, and another with twelve; and some "Killers" (*Orcus*) with twelve, thirteen or fourteen ribs. As to the number of vertebræ, it is true that they do not vary with age, but they vary in number in the same species. The *Balænoptera rostrata* Fabr., so remarkable for its forty-eight vertebræ, sometimes has forty-nine, and he has seen at Bergen, a skeleton of a male and of a female, both from the coast of Norway, of which one had only forty-five vertebræ, and the other forty-nine. Mr. Flower has counted fifty, and Lacépède has mentioned forty-six as occurring in the same species. — *Cosmos.*

Eggs of Yama mai Silk-worm for Sale. — I have received from England, *on sale*, a number of eggs of *Attacus Yama mai*, which I am now ready to deliver. The price of *Yama mai* eggs is ten for 30 cents, or thirty-five for $1. Picked eggs direct from Japan. — W. V. Andrews, 136 *Charlton street, New York.*

Transportation of Living Fish from South of the Equator to Europe. — Mr. Moore has succeeded in importing into Liverpool from the River Plata, the first living fish (a fresh-water Cyprinoid) that has been received from the south of the Equator. Dr. E. P. Wright has also brought to Paris living specimens of the only fresh-water Cyprinoid of the Secheylles Islands— *Scientific Opinion*, December.

Deep Sea dredging. — Dr. E. P. Wright has dredged in 480 fathoms, off the coast of Portugal, living specimens of the Glass Sponge (*Hyalonema Lusitanicum*). Until first discovered by Prof. Bocaga, of Lisbon, it had only been known from Japan.

At this great depth, also, lives a shark (*Centroscymnus cœlolepis* Bocage & Cap.), a small fish (*Chiasmodon niger* Johnson), and an Isis-like coral (*Keratoisis Grayii* Wright). — *Annals and Magazine of Natural History*, December, 1868.

Marsupial Dogs. — Of all mammals there is perhaps not one existing which is so truly interesting, so deeply significant of the history of the development and geographical distribution of mammals, as the marsupial dog. There are two Tasmanian species of this genus, *Thylacinus*, one of which is called the greyhound, and the other the bull-dog tiger. — *Quarterly Journal of Science*, January, 1869.

The Belted Kingfisher again. — I notice in the Naturalist so many conflicting statements relative to the nesting of the Belted Kingfisher, that I feel prompted to add my own observations upon the breeding of this well known bird. In Southern Illinois the Kingfisher is resident, and usually begins incubation about the middle of April. I have found numerous nests, all similarly located, viz., in the bank of some stream, or ravine, frequently far from any stream affording it a supply of food. On one occasion I found its excavation in the cut of a railroad, at least a mile from the river. The excavations that I have found varied in length from three to as much as nine feet, but more generally

about six feet. Frequently the excavation makes a rather abrupt bend, in the form of an elbow, but I have often found it straight to the end. I believe the termination is a little higher than the entrance. The "nest was always in a sort of oven-shaped chamber, near the end, the bottom being a little lower than the floor of the tunnel." I have never found any elaborate nest, the eggs in a majority of cases lying on the bare earth. On two occasions, however, I have found a bed of broken fragments of craw-fish shells, and fish-bones; but never to my knowledge any sticks or straws, or, indeed, feathers except those from the body of the owner. I have never found the bird sitting on less than six, or more than seven eggs, and I do not believe the number ever exceeds the latter. Both sexes incubate, as I have caught both male and female upon the eggs.—ROBERT RIDGEWAY.

GEOLOGY.

KJŒKKENMŒDDINGS IN IOWA.—In November last, Mr. J. J. Kinersly of Keosauqua called my attention to some aboriginal relics he had discovered upon the bank of the Des Moines River, near that place, while the workmen were cutting the bank for a road to a newly established ferry, and digging a hole for the post which supports the ferry-rope. In digging this hole they passed about four feet through a layer of silt-like earth, crowded with the shells of Unios, before they reached the original surface. These shells are of the same species that now inhabit the stream, among which were recognized *Unio plicatus*, *U. rectus*, *U. metanevra*, *U. crassus*, etc. The locality is just above the mouth of a small creek, which has cut into the accumulation by the shifting of its channel, and leaves it without that symmetry of outline it would doubtless have possessed if it had not been disturbed. The heap is not above the reach of the highest floods of the river, and has evidently been largely composed of the silt brought down by the river and creek at the times of high-water. Mingled with and composing a large part of its bulk, are the shells which were brought from the bed of the river when the water was low—the only time they are accessible—and the mollusks were evidently cooked and eaten upon this spot during many years. The bed of the river opposite this spot is broad and gravelly, and an excellent habitat for the mollusks, while both above and below the bottom of the river is not so favorable for their growth.

No other shells besides Unios were found, although a few others may yet be discovered. Very few other kinds are to be found in the river near there. The bones of the deer are common among the shells, the marrow bones always being split open. Pieces of the carapace and other bones of the fresh-water turtle were also found. Among the implements found by the slight excavation mentioned, are one hatchet of greenish hornblendic rock, some flint arrow-heads and sharp-edged flints, probably used for skinning animals, and fragments of crude pottery. Some fragments of the latter bear evidence of having been burnt in contact with

organic matter, and were probably broken and spoiled while being used for cooking purposes. Fragments of charcoal were frequently found scattered through the mass.

The pottery is composed of common clayey earth intermixed with sand and slightly baked; some of the surfaces are rudely ornamented by cancellated scratches, and some are marked as if they had been enclosed while soft in a loose fabric or netting, probably of twisted bark fibres, the twist of the thread being easily distinguished.

The examination of this interesting accumulation has been very slight, but it is proposed to resume it next season. — C. A. WHITE.

RHEUMATISM IN PREHISTORIC TIMES. — At the last meeting of the Pathological Society of London, Mr. Bush exhibited some specimens of pathological fossils. He exhibited a bone of a fossil rhinoceros which had been afflicted with rheumatism. He also exhibited a bone of a cave-bear, with a consolidated fracture, which had been broken just before the animal had hibernated; and another bone, of the same species of bear, which had been the seat of an osseous tumor. — *Cosmos.*

Disease also appeared among the reptiles of the Cretaceous formation of New Jersey, for Prof. E. D. Cope writes us: "I have just discovered a remarkable ally of Mosasaurus, which has a permanent functional dislocation of the ramus of the mandible. It has an articulation behind the middle, which has lateral and some vertical motion."

Disease is more common among the lower animals than is usually supposed. Prof. J. Leidy has exhibited to the Philadelphia Academy of Natural Sciences, pus globules from an abscess in the muscle of an oyster. — EDITORS.

FOSSIL PLANTS FROM GREENLAND. — Mr. Whymper has brought from the tertiary formation in Greenland, 137 species, of which forty-six are common to the European deposits of the Miocene Tertiary. Among the specimens are the cones of the magnolia, and the flowers and fruit of the chestnut. — *Cosmos.*

THE EARLIEST PLANT. — The discovery of Eozoön in the Laurentian rocks of Canada was of great interest. One of the most important discoveries recently made in palæontological science is analogous with it. It is the detection of what appears to be the remains of a terrestrial flora in certain Swedish rocks of Lower Cambrian age, — the supposed equivalents of our Longmynd rocks. A peculiar interest attaches to this discovery, inasmuch as it carries back the appearance of terrestrial vegetation upon the earth's surface through a vast interval of time, no land-plants having previously been known older than the Upper Ludlow beds. The Swedish fossils now discovered appear to be the stems and long parallel-veined leaves of monocotyledonous plants, somewhat allied to the grasses and rushes of the present day. These plants apparently grew on the margin of shallow waters, and were buried in sand and silt, although it is probable that several species, and even genera, may occur in the sandstone blocks which have been examined. They are provisionally in-

cluded in a single species, to which the name of *Eophyton Linnæanum* has been given. Eophyton, therefore, stands by the side of Eozoön, — the one being, in the present state of our knowledge, the earliest land-plant, as the other is the earliest animal organism. — *Quarterly Journal of Science.*

PROCEEDINGS OF SCIENTIFIC SOCIETIES.

Historical Society of Passaic, N. J. — This active society was organized March 28th, 1867, and held its first field meeting July 15th, 1868, when glacial marks were discovered upon the rocks near Little Falls, running in a south-easterly direction.

ANSWERS TO CORRESPONDENTS.

J. H. B., Camp Grant, near Richmond, Va. — The smaller of your plants is *Selaginella apus*. The larger is *Hypnum tamariscinum*. Both are found widely distributed through the United States. — J. L. R.

C. G. A., Augusta, Me. — Your insect boxes should be made as near air-tight as possible to be insect proof. The cover should shut down upon an inner shoulder, so that an invading insect will have to make four turns in order to get fairly inside the box. The inside should be daubed with creosote; or camphor, wrapped in paper with pin holes, should be pinned to the bottom of the box.

S. P. M., Cold Springs, N. Y. — Agassiz's "Methods of Study" is a good introductory Book for beginners in Zoölogy, and may be read with Tenney's "Zoölogy for Schools," Clark's "Mind in Nature," and Agassiz and Gould's "Principles of Zoölogy."

W. H. E., Coalburgh, W. Va. — The worm enclosed, which is two feet long, and the largest one we ever saw, is a gigantic Hair-worm (*Gordius*). Compare the account of the Gordius-like worm on p. 41. Also see Vol. I, p. 556.

D. M., Hamilton, Ohio. — The specimens are the "Basket-worm, or larva of the *Thyridopteryx ephemeræformis*, and will probably disclose the moth next spring. It feeds on different species of evergreens, and also on other plants, including the cotton.

F. P., Indianapolis, Ind. — The fern is *Aspidium achrostichoides* (a barren frond). It is common on shaded hillsides in the Northern States. We shall be pleased to get *good* specimens of the aquatic plants which we will have named for you. Send the set under numbers corresponding to those on the specimens you keep.

O. C. M., New Haven, and others. — Your papers for the Proceedings of the Chicago Meeting of the American Association for the Advancement of Science, should be sent to F. W. Putnam, Salem, Mass., quite soon, to be in time for printing. — F. W. P.

BOOKS RECEIVED.

On the British Species of Alpheus, Typton, and Axius, and on Alpheus Edwardsii of Audouin. By the Rev. A. M. Norman. (From the Annals and Magazine of Natural History for September 1868.) 8vo, pp. 6.

Cecil's Books of Natural History: — Cecil's Book of Insects; Cecil's Book of Birds; Cecil's Book of Beasts. By Selim H. Peabody. Chicago: Clark & Co. 1868. 12mo.

Report upon Wool and Manufactures of Wool. (Paris Universal Exposition, 1867. Reports of the U. S. Commissioners.) By E. R. Mudge, assisted by John L. Hayes. Published by the National Association of Wool Manufacturers. Washington, 1868. 8vo.

Naturalist's Note Book. January. London.

Catalogue of the Orthoptera of North America described previous to 1867. Prepared for the Smithsonian Institution by S. H. Scudder. Washington, 1868. 8vo, pp. 89.

Scientific Opinion (Weekly). November, December, 1868. London.

The American Agricultural Annual. New York: Orange Judd & Co. 12mo. 1869. 50 cents.

The American Horticultural Annual. New York: Orange Judd & Co. 12mo. 1869. 50 cents.

The Canadian Entomologist. January, 1869. Toronto. 50 cents (gold) a year.

On the Dynamics, Principles and Philosophy of Organic Life; An Effort to obtain definite conceptions of How do Medicines produce their Effects? By Z. C. McElroy, M. D. St. Louis, 1869. 8vo, pp. 40.